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Journal of Occupational Medicine

Personal Responsibility in Accidents

Gerald Gordon, M.D., Wilmington, Del.

SINCE World War I, when reports from Woolwich Arsenal in England suggested that accidents did not happen at random throughout an exposed population, articles have appeared from time to time touching on one aspect or another of the apparent problem. The concept of the accident-prone individual has been supported and attacked. Although it has not been established as a scientific fact beyond controversy, the concept refuses to die.

It has been a fairly common observation that some human beings persistently do things which are not in their own best interests. They may overindulge in alcohol to the point of destroying their health; they may commit suicide; frequently they wreck their own automobiles with themselves inside.

Other difficulties in which persons find themselves, including such things as sickness, debt, and divorce, statistically are not always chance affairs wherein the person is clearly the victim of misfortune. Careful study of the life history will reveal a pattern of performance which is so constant that it cannot be otherwise than motivated from within.

Yet we are all exposed to essentially the same general stresses and hazards. Why do certain persons behave in a manner which is less effective for adaptation than that of others?

The pattern of behavior exhibited by an individual has been termed the "life style," and when once established it is remarkably constant, even when productive of pain and unhappiness for himself and others. For example, alcoholism rarely changes unless some outside influence is brought to bear. This influence may be psychotherapy, an inspiring teacher or understanding boss, or even the pressure of society or of the law.

The adult's pattern of behavior is the sum total of all his previous experiences and is based on the standards of value which have gradually evolved and are highly distinctive. Value judgments are deeply rooted and serve as guideposts by which the individual interprets the reality about him; and as he interprets this personal reality, so will he behave. Standards which are unrealistic and self-destructive are just as potent motivations as standards which are realistic and survival-promoting.

But it takes considerable effort in the process of growing up to train the basic survival instincts into self-destructive forces. The human organism is an integrated structure in which the body supplies protection, mobility, and nourishment to the nervous system; the nervous system, in turn, senses survival needs of the body and directs, disciplines, and implements all its activities to the end that it does survive. A cinder in the eye drives us relentlessly to get it out; a pillow over the face stimulates an almost superhuman struggle for air; hunger forces us to seek food; fear tells us when to stay and fight or when to run. Yet the persistent behavior of some persons suggests that something is seriously amiss with their nervous systems, for, given a choice, they seem almost deliberately to take the self-destructive course in complete contravention of the instinctive drive to survive.

An illustration of the wrong kind of training

Dr. Gordon is Chief, Psychiatric Section, Medical Division, E. I. du Pont de Nemours and Company.

Presented at the Forty-Fifth Annual Meeting of the Industrial Medical Association, Rochester, N. Y., April 28, 1960.

leading to unrealistic standards of value came to my attention recently. It is the case of a 17-year-old boy in our community who was reported to the police for speeding on streets where many small children play. The husband of the woman who reported the boy is employed in the same company as the boy's father, and the boy's father brought intense pressure through company contacts to force him to get his wife to withdraw the charges. The history reveals that the father has repeatedly protected his son from responsibility for traffic violations as well as many other misdemeanors.

So long as this boy is spared the consequences of his misbehavior, he will continue to develop an arrogant feeling of invulnerability, a conviction that he is not subject to the normal rules of life. He is establishing a set of values which are not only unrealistic for his personal survival but contrary to the welfare of the entire community. Inevitably, unless some drastic influence intervenes to change the direction of his life pattern, he will injure himself or someone else. He is developing a completely asocial, disordered way of life which can only lead to unhappiness and ultimate disaster.

It is not too difficult to imagine this same boy 10 years from now in the position of the driver of the truck which crashed into the rear of a stopped bus, killing 10 persons. The *Philadelphia Evening Bulletin* reports that the driver "had had ten brushes with the Law for traffic offenses. He had been fined twice for speeding in New Jersey, warned three times in Pennsylvania for speeding, going through a red light, and had averaged one summons a year in New York for going through stop signals." Any one, or two, or even three of these events could have been chance alone, but the entire record suggests some personal factor responsible for these repeated incidents. The prevention of this one accident and the loss of 10 young lives would justify many years of research. How many more such situations may be in the making at this moment is beyond guess.

It is likely that records already exist which, if studied carefully, could point out persons liable to have accidents before the accidents occur; but we do not know how to locate and interpret them in advance, or we do not take the trouble.

Tillman and Hobbs[1] report a study of the general social adjustment of a group of 96 motor vehicle drivers who had been involved in four or more accidents. Of this group, 66% were known to the credit bureaus, law courts, and social service agencies, including the venereal disease clinics, as having been in some other kind of trouble before, as against only 9% of a control group. The authors concluded that a poor accident record was only one manifestation of an inadequate method of living.

All the evidence seems to point to human failure as the predominant cause of industrial as well as motor vehicle accidents. Fulton,[2] recently retired from General Motors Corporation, did some monumental work in the field, keeping and interpreting records as early as 1942. His analysis reveals that a 30% group create the majority of problems. His findings may be fairly summed up in his own words:

> Environment, occupation, physical conditions, etc. play the minor role in the incidence of injury and physical complaints during working time. A safe and unsafe worker retains the same status regardless of environment and occupation. We do not intend to convey the idea that the status never changes. We do, however, point out that, with extremely few exceptions, the status of those individuals who make up our basic 30% group never changes so long as they are left to their own devices. When a change for the better does occur, the reason can almost always be traced to *some personal attention paid directly to the individual.*

Our own studies[3] seem to confirm clinical observations that certain persons bear a highly disproportionate share of life's misfortunes, including so-called accidental events or injuries. Investigations by our saftey supervisors reveal that in 90% of accidental injuries the factors which created the injury had been under the direct control of the person involved. Other industries report essentially the same findings.

People are so well safeguarded in modern industry, automoblies and highways are so well designed and constructed, that it is rare to find that some force broke from its controls and caused injuries. But much more research is needed into the personal factor behind accidents.

When it is possible for the National Safety Council to predict accurately the number of highway deaths over holiday weekends, year after year, through simple statistical methods, it ought to be possible to learn how to predict, from proper records, the persons who will become these statistics.

In the plant, the industrial physician and safety supervisors are in an advantageous position to set up and study systems of records sufficiently reflective of all elements of human failure so that a destructive life style may be determined as early as possible. Long-range performance may be predicted from early minor evidences of human failure. Industrial medical records have shown, for instance, that a person who has a poor attendance record for a period may shift to being a personnel problem, later repeatedly injuring himself. In the absence of major personality change, past per-

formance is probably the best indication of future performance known.

Summary

Chance plays a much smaller role in the affairs of men than commonly assumed including so-called "accidental" injury as well as other apparent "misfortunes."

Man tends to be more governed by motivations in his own personality which are only manifested in his behavior.

Extant records of behavior, such as found in industrial medical and personnel files as well as those in state highway departments, will often reveal a self-destructive life style which may be predictive of future behavior.

But records buried in files are useless unless periodically summarized and the information utilized. It is our impression that most medical records already contain much revealing data.

In the absence of any incentive and motivation to change, human personality is extremely persistent but not irresistibly so. Records of past performance are an invaluable adjunct in diagnosing the poorly motivated person.

Often the mere confrontation of the patient with the evidence of his destructive "life style" is in itself corrective, but if ineffectual then further measures must be sought; the alternative is a continuing self-destructive path.

Personal responsibility for all that happens when superficially viewed appears to be a grim prospect yet actually carries a more hopeful prognosis than does the concept that man is a helpless pawn of fate.

(The author's address is Medical Division, E. I. du Pont de Nemours and Company, Wilmington, Del.)

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Industrial Medical Aspects of the Acute Dysentery Syndrome

A Laboratory, Clinical, and Industrial Study of the Acute Dysentery Syndrome Among Workers in a Tropical Oil Refinery

Philip C. Holzberger, M.D., and Stanley Schoenfeld, Aruba, N. W. I.

AMONG male employees in a tropical oil refinery,* our statistics show that dysentery syndrome—cramps and diarrhea, with or without vomiting—follows the banal upper respiratory infection as the second commonest cause of time lost for medical reasons. The importance of establishing etiology can hardly be underestimated, especially when dealing with food-handlers and employees who travel. More often than not, however, the physician is obliged to act before this is possible. Until told by the laboratory, he cannot know which case is potentially dangerous to the patient, his family and community, yet, pressed by circumstances, may prescribe drugs which negate further laboratory studies. This dilemma prompted the following study, of which Part I reports our clinical, laboratory, and industrial experiences with a series of 200 consecutive cases of dysentery syndrome among workers in a large oil refinery, and Part II, in a subsequent series of 50 cases of proved bacillary dysentery, examines problems associated with false negative culture.

Part I

Methods and Materials

Between April and September, 1958, a total of 200 consecutive cases of dysentery syndrome among male refinery workers, ages 17 to 56 years, were selected, worked up, and treated according to the following criteria:

*The Lago Oil and Transport Company, Limited, Aruba, N. W. I., currently employs more than 4,500 men. One hundred eighty-three women are also employed, as schoolteachers, stenographers, and hospital personnel.

Dr. Holzberger is staff physician and Mr. Schoenfeld is technician, Employee Medical Center, Lago Oil and Transport Company, Limited, Aruba, N. W. I.

Submitted for publication Nov. 2, 1960.

Selection—Cases were selected on a history of cramps and diarrhea, with or without vomiting, up to the time of the visit to the Employee Medical Center, and on history of no antibiotic or chemotherapy within three days of the visit to the Employee Medical Center.

Concerning this heading: Over the five-month period involved, 8 patients were listed twice and 1 patient three times, or 200 consecutive cases among 189 patients. Duration of symptoms varied from several days to a matter of hours, averaging 18 hours from onset to initial medical visit. There was positive family history of dysentery syndrome in only 24 (12%).

Diagnosis—All patients were examined digitorectally and a swab introduced under the examining finger for immediate culture inoculation on S.S. medium by the physician.

Whenever possible, our routine laboratory procedure was also carried out; i.e., a fresh stool specimen submitted to the laboratory was drawn with sterile platinum loop over S.S. medium and an unstained slide prepared for microscopic examination. All stools were tested for occult blood unless frank blood was seen.

Concerning this heading: 26 cases (13%) did not undergo the laboratory routine—on 6 occasions the laboratory was closed, on 19 occasions the patient could not produce a stool, and on 1 occasion the specimen was examined microscopically but inadvertently discarded before culture by the laboratory.

Therapy—All patients were treated with oxytetracycline, 1.0 gm four times daily for one day, plus whatever antiparasitic medication was indicated. Paregoric and/or tincture of belladonna were also given symptomatically in all cases. In nine cases, for clinical reasons only, the oxytetracycline course was repeated on the second day.

Observations

Clinical and Lost-Time Considerations—In these 200 consecutive cases a total of 220 days of work was lost—an average of 1.10 days per case. A two-hour test period for control of symptoms was allowed, however, during which time those patients not seriously ill were permitted to sit in the Employee Medical Center waiting room after they had taken their first dose of medication. As a result, 67 patients officially lost no time at all.

Clinically, the 200 cases were classified as "Good," "Fair," or "Poor," depending on their condition on arrival at the Employee Medical Center. Oral temperature of 37.5°C (99.5°F) automatically excluded the patient from the Good group, but the borderline between Fair and Poor was much less exact, depending as much on how the patient said he felt as on objective clinical findings.

In 43 (21.5%) Good cases 14 days of work were lost, or 6.3% of the total time lost, averaging 0.33 days lost per case.

In 137 (68.5%) Fair cases 151 days of work were lost, or 68.7% of the total time lost, averaging 1.10 days lost per case.

In 20 (10%) Poor cases 55 days of work were lost, or 25% of the total time lost, averaging 2.75 days lost per case.

Laboratory Considerations—On the basis of laboratory results, the series can be divided into two groups: Etiology Proved (39 cases, or 19.5%) and Etiology Unproved (161 cases, or 80.5%).

Concerning the Etiology Proved Group: 34 cases cultured positive for various Shigella organisms, 2 cases cultured positive for Salmonella organisms, 1 case mixed Endamoeba histolytica trophozoites with Sh. flexneri bacilli, and 2 cases showed motile trophozoites of E. histolytica exclusively. These 39 patients lost 74 days work, averaging 1.89 days lost per case.

Concerning the Etiology Unproved Group: incidental findings included one case of multiple polyposis and one case of mucous cyst of the rectum. The important characteristic of this group is that clinically they were only slightly less sick than the cases of proved etiology. In an evaluation, 39 were classed as Good, 110 as Fair, and 12 as Poor; they lost 146 days of work, or 0.91 days lost per case. As relapses after more than a three-week interval, eight patients were listed twice and one patient three times.

Comment

It proved particularly interesting to compare the positive bacteriological results obtained by rectal swab with those obtained by routine laboratory procedure of loop inoculation. Excluding 4 cases—2 in which the dysentery was apparently solely amebic in origin and 2 in which the patient was unable to submit a specimen to the laboratory—35 comparable cases remained. Of these, the standard laboratory procedure using submitted stool yielded 23 positive results, and the rectal swab method yielded 32 positive results.

Among the 161 cases of unproved etiology, 22 showed mucous stools containing many red and white blood cells, and 3 cases required hospitalization on the second day of illness, both features strongly suggesting missed bacteriological diagnosis.

The shortcomings of inoculation of fresh stool on a single medium seemed apparent. To investigate the matter further, Part II of this study was undertaken.

Part II

Methods and Materials

A subsequent series of 50 consecutive cases of proved bacillary dysentery—1 Paracolobactrum of the Ballerup-Bethesda (B.B.) group and 49 Shigella organisms—was then compiled, using three methods:

1. Inoculation of freshly submitted stool by wire-loop technique on S.S. medium;
2. Inoculation of material obtained by rectal swab, at the time of physical examination, on S.S. medium;
3. Inoculation of material obtained by rectal swab, at the time of physical examination, on desoxycholate citrate medium.

Observations

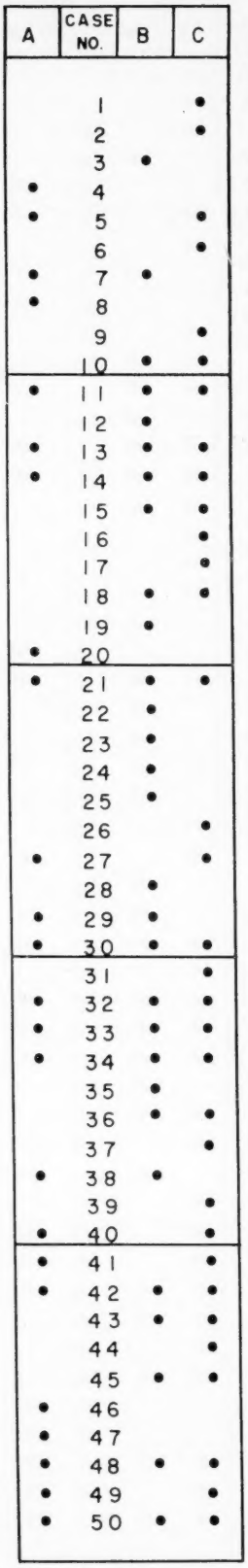
1. Inoculation of freshly submitted stool by wire-loop technique on S.S. medium yielded 24 positive cultures, or 26 false negatives.
2. Inoculation of material obtained by rectal swab at the time of physical examination on S.S. medium yielded 29 positive cultures, or 21 false negatives.
3. Inoculation of material obtained by rectal swab, at the time of physical examination, on desoxycholate citrate medium yielded 33 positive cultures, or 17 false negatives.

(See Fig. 1, where graphic presentation of the series shows that by using the rectal swab method on two complementary media a total of 45 positive cultures out of 50 possible, or only 5 false negatives, is reportable.)

Discussion

Diagnostic Considerations

The figures presented show that the isolation of enteropathogens responsible for bacillary



dysentery is inexact, subject to wide variation in results depending upon techniques used.

Rectal Swab—After a stool is passed, Shigella forms decrease rapidly[1] and best results can be obtained only by immediate inoculation. The advantages of rectal swab inoculation have been shown by many authors,[2, 3] but the precedure is not always feasible for the average practitioner or laboratory. In an industrial frame, however, the physician faced with a fresh case of dysentery syndrome can usually find the means at hand to combine physical with laboratory examination and establish the basis of an exact etiological diagnosis before negating such efforts with the necessary therapy. When using a rectal swab, there are no bacteriological "no specimen" cases.

Media — McBurney[4] classifies the commonly used media as selective or differential but reserves the two terms exclusively for desoxycholate citrate agar. Cheever[5] considers both S.S. (Difco) and desoxycholate citrate agar as the most useful for the isolation of dysentery bacilli. In the isolation of pathogenic Escherichia coli—a rising problem—S.S. agar is certainly preferable. It is possible, however, to have what the French call King's Choice: both. This can be achieved by using two Petri dishes or, since one colony constitutes a positive culture, both media in a split Petri dish.* No doubt one could obtain still better results by the additional use of other media, but we feel that in these days of effective antibiotic therapy the outpatient diagnostic effort in all but the most violent or chronic cases must hinge on judicious simplicity.

Therapeutic Considerations

The choice of oxytetracycline to control the symptoms and infection of the cases in this series is well established. The development of resistant Shigella strains during such broad spectrum therapy also seems rare.[6] In a series of 225 isolations of Shigella organisms, Hardy and others[7] showed 60% of the strains isolated to be resistant to sulfadiazine but only 0.4% resistant to oxytetracycline. The massive one-day dosage appears justified by the results.

Among the 250 cases presented, 4 patients were given a subsequent oral course of mycostatin but only on the slightest provocation as the course of oxytetracycline, 1.0 gm q.i.d. × 1, caused no frank cases of fungous enteritis.

Industrial Considerations

Our figures show that even under the difficult work conditions of a tropical oil refinery one case in three of dysentery syndrome can be treated on the job if the patient comes early to the Employee Medical Center, commences broad-spectrum antibiotic therapy, and is allowed a two-hour rest-test period. In suspicious cases, moreover, the industrial physician may render a valuable service to the employee's family physician by using in-plant facilities to establish etiology.

*Apropos of this, we believe a most welcome addition for most industrial clinics would be a split plastic Petri dish with a screw-on top. This would allow wide latitude in handling: easy storage for several weeks after pouring, especially if also sealed in a polyethylene bag, and equally easy postinoculation resealing prior to transfer to the bacteriological laboratory. Since neither S. S. nor desoxycholate citrate agar demand the sterile technique involved in using blood agar, such equipment is entirely feasible.

Fig. 1—A graphical comparison of the results of Part II in this study. The dots in the graph signify positive culture. Column A: loop inoculation of freshly voided stool on S.S. agar; Column B: rectal swab inoculation on S.S. agar; Column C: rectal swab inoculation on desoxycholate citrate agar.

Comment: It is important to note that while there are 24 positive cultures in column A, 29 in column B and 33 in column C, by combining the results of columns B and C, the bacteriological diagnosis is established 45 times out of a possible 50. In 28 cases—more than half in the series—either column B or column C showed positive, indicating the importance of using multiple complementary media to avoid false negative laboratory results in the diagnosis of bacillary dysentery.

Summary

A two-part study of dysentery syndrome (200 consecutive cases) and proved bacillary dysentery (50 subsequent consecutive cases) is presented. Industrial, clinical, and laboratory aspects are evaluated and the efficiency of plating from rectal swab on complementary media.

(The authors' address is Lago Oil and Transport Company, Limited, Aruba, N. W. I.)

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The Four Medical Centers of the Amalgamated Clothing Workers of America

Morris Brand, M.D., New York, N.Y.

IT IS THE impression of many in the labor health field that the medical profession and the public, which, of course, includes union members, are becoming increasingly aware of the positive values of the direct-service medical plans and the value of providing these services either in their own facilities or through the nonprofit group-sponsored programs. As evidence to substantiate this, witness the increase in the number of labor-management sponsored medical plans in the past decade, the growth of the Health Insurance Plan of Greater New York and the Kaiser Permanente Plans through the enrollment of many union groups, the extensive medical program provided the coal miners by the United Mine Workers Welfare and Retirement Fund in 10 hospitals and a number of medical groups, and now the development of the Community Health Association in Detroit initiated by the United Auto Workers. The Group Health Association of America can testify to the many requests from union leaders and trustees of labor-management controlled health and welfare funds for information regarding the organization of service-type programs.

The industrial physicians are no less aware of the benefits of direct medical services, the need for dovetailing and for continuity of the many services in the proper application of modern medical care, and also the need to integrate far more closely their occupational health programs with the day-to-day medical services provided in the group medical centers.

There are many who draw a sharp line between "in-plant" and "out-plant" medical needs of the workers, but there are others who justifiably maintain that some proportion of the millions of manpower days lost each year which are considered generally to be due to nonoccupational illnesses and injuries may be related to occupational factors. Dr. J. H. Sterner of Eastman Kodak Company in discussing this subject said:[1] "The interfusions with elements of nonoccupational environment will be frequent and indistinguishable." It is obvious that where labor medical centers and the in-plant medical services coexist there is need for closer understanding and cooperation between them. The presentation, therefore, of examples of labor-management sponsored direct-service programs may be considered timely and necessary.

Presented at the Industrial Health Conference, Rochester, N.Y., April 26, 1960.

Dr. Brand is Medical Director, Sidney Hillman Health Center, New York, N.Y.

Four Medical Centers

Each one of the four Amalgamated medical centers is sponsored by a joint board of the Amalgamated Clothing Workers of America (ACWA). The Sidney Hillman Health Center in New York City was first opened in April, 1951, followed shortly by the Sidney Hillman Medical Center in Philadelphia. Then came the Sidney Hillman Health Center in Chicago and the Amalgamated Laundry Workers Health Center in New York City. The four centers serve a combined total of about 95,000 active and retired union members plus an undetermined number of wives.

Each center has a board of directors which includes representatives from the employer associations and the unions comprising the respective joint boards. This is in accord with the requirements of the Taft-Hartley Law. A joint union board is made up of a number of union locals representing the different crafts in the industry. The New York Joint Board of the Men's and Boy's Clothing Industry has 27 such union locals.

Each center may provide services to the members of more than one ACWA joint board. The Sidney Hillman Health Center which was estab-

lished to serve primarily the members of the New York Joint Board also serves the members of the Joint Board of Shirt, Leisurewear, Robe, Glove and Rainwear Workers' Union. The Amalgamated Laundry Workers Health Center serves members of its own joint board and two others, and as a result of enabling legislation amending their charter it is expected that it will also serve AFL-CIO union groups other than those in the ACWA.

Governor Rockefeller signed an enabling act which will premit another ACWA center to be opened in Rochester.

The name of Sidney Hillman is used frequently to name the centers because he was the first president of the ACWA and each center is considered a monument to him. These dreams and ideas of Sidney Hillman subsequently were transformed to actual realities by the union officers through collective bargaining with the employers. In New York City, these were the officers of the New York Joint Board of the ACWA led by Louis Hollander; in Philadelphia, the late Charles Weinstein; in Chicago, Samuel Smith; and in the Amalgamated Laundry Workers Joint Board, Louis Simon—all managers of their respective joint boards.

In addition, and in all fairness, one can add that there was wholehearted cooperation from the employer association.

These ambulatory-type medical service programs complement the Amalgamated's nationwide welfare insurance program for surgical and hospital indemnity benefits, life insurance, retirement plan, unemployment and disability coverages. The ACWA's social insurance program has a few gaps which need closing, but in essence it is quite comprehensive in scope. When industrial conditions permit, the ACWA takes every opportunity to improve its benefits. In the opinion of Jacob Potofsky, the present president of the ACWA, the centers are "milestones in the ceaseless effort of the ACWA to enlarge the security and well-being of our members."

Sidney Hillman Health Center of New York

Since all the centers provide medical services to ambulatory members in the form of preventive, diagnostic, and therapeutic services, it will be well to give a detailed picture of one, the Sidney Hillman Health Center of New York, and then note the differences applicable to the other centers.

The Sidney Hillman Health Center is located in the heart of the Men's and Boy's clothing industry in lower Manhattan. The building, a former YWCA dormitory with about 36,000 square feet, was purchased, converted, equipped, and furnished at a cost close to a million dollars to provide medical services to about 40,000 members of the New York Joint Board. The capital for this and subsequent major renovations and for new equipment was provided in a special fund established through negotiations by the unions and the employers. At later dates, the nonworking wives of the New York Joint Board members as well as the Shirt and Leisurewear Workers Joint Board members were granted the right to enroll voluntarily. In effect, therefore, the Sidney Hillman Health Center may be considered a multiunion center.

The Center is organized legally as a membership, nonstock, nonprofit corporation under a special state legislative act in 1949 "to establish and maintain a health center where medical care, surgical care, optical and dental examinations would be furnished, all through duly licensed physicians." The New York State Board of Social Welfare subsequently approved the Center's facilities and general procedures.

Organization

The Center's Board of 31 Directors is responsible for the Center's activities. There are 17 union and 14 employer representatives on the Board. A Medical Advisory Council of six members, appointed by the Board, established professional standards, approves physicians' applications for staff appointments, supervises the professional services in the clinic, and makes those recommendations to the Board which in its opinion would broaden the scope and maintain a high level of quality in medical care. The Council members include the medical director, ex-officio, two staff physicians, and three nonstaff physicians who are known for their interest in the wider distribution of better medical care to the public. The first chairman of the Council was the late Dr. Ernst P. Boas. The present chairman is Dr. Martin R. Steinberg, director of the Mount Sinai Hospital of New York City.

The medical director appointed by the Board of Directors is responsible to the Board and the Medical Advisory Council for the proper and effective administration of the Center.

There is also a Joint Conference Committee which includes members of the Board's Executive Committee, three members of the Medical Advisory Council, the medical director, and two staff physicians. This committee was established for those occasions when there are strong differences of opinion with regard to professional matters affecting the interests of the corporation. The recommendations of this Committee are referred to the Board of Directors for final decision.

Services

The union members pay $10 per year, as do each of the wives and the retired members who elect to become subscribers. As a result of collective bargaining negotiations, the employers have been paying one-fourth of 1% of wages toward the cost of operating the Center. The wives and retired members, who generally require more services, therefore benefit beyond their personal payments of $10.

Except for those medications which are prescribed by the staff physicians to be taken home and which are dispensed in the Center's pharmacy at slightly above cost, all services in the Center are provided without cost. There are no limitations concerning age, sex, and frequency of visits or services by physicians within the scope of benefits provided in the Center. These benefits include the initial and subsequent periodic health evaluations, routine screening laboratory procedures, chest surveys, individual and group immunizations, diagnostic radiographic and laboratory procedures, therapeutic advice and prescriptions, limited minor surgical procedures, physical therapy, injections, and rehabilitative procedures. Assisting the 70 part-time general and specialist physicians, there are 57 employed persons, including registered nurses, registered or licensed technicians and therapists, medical librarian, pharmacists, nutritionist, medical social service counselor, and the administrative personnel including the medical director.

Health education of the members is limited to articles in the union periodicals. Members are urged to seek the preventive services including early diagnosis and treatment. Lectures at union meetings and in the shops were tried but met with insufficient success.

More than 90% of the services are by appointment. The number of appointments issued per physician depends on the specialty and on whether the patient is new to the service, is in for a health examination in general medicine, or is on a revisit. To the extent practical, retirees and wives are given appointments in the morning sessions; appointments during the lunch hour and in the 4-6 p.m. session are issued to the workers. Members with urgent or emergency conditions are seen immediately in the emergency clinic by a physician who is available all day. His time generally is well occupied. If a specialist is needed to treat an ambulatory type of emergency condition and the particular specialty is not scheduled at the time, the member is referred to the office of the specialist. The Center covers the cost.

The medical social service counselor assists members in many ways, for example, with explanations of physicians' recommendations regarding hospitalization, discussions of costs and available insurance coverages, and maintenance of follow-up service for specific conditions, e.g., glaucoma. She arranges to bring back to the Center those members who either fail to keep an appointment or whose diagnostic procedures indicate a need for urgent or emergency attention, and she also assists in referrals to community agencies and institutions.

When a member is advised in the Center that hospitalization is necessary for any reason, the member is informed by the medical social service counselor that he may select a staff or nonstaff physician. The Amalgamated Insurance Fund will indemnify the members for surgical and hospital costs in accordance with their schedule of fees. In all the centers, staff physicians have agreed to provide their services in accordance with their respective Blue Shield fees, which in most instances are almost the same as the Amalgamated's fees.

The Center cooperates with nonstaff physicians treating eligible members when they request diagnostic procedures and consultations with specialists. Reports are mailed to them. When indicated that a condition needs immediate attention, the physician is informed of the results by telephone. There is no charge for this service.

Unfortunately, because a great deal of the industry is conducted in small shops, there are relatively few in-plant physicians and nurses; but, where they are employed, full cooperation is extended to them as long as the condition of the employee is not of occupational origin. No reports are issued without the patient's authorization. It is interesting to note that no specific occupational hazard of significant proportion has been found to date.

The Sidney Hillman Health Center does not provide dental care, and, although psychiatrists are available for consultation, psychiatric treatment unfortunately cannot be provided. Members in need of psychiatric therapy are referred either to a community agency or to private psychiatrists, depending on their ability to pay for the latter. Members suffering from nonemergency injuries or illnesses covered by workmen's compensation insurance cannot have such conditions treated in the Center but are referred to the social service counselor, who explains the reason and informs them of their rights under the law.

The quality of service is closely supervised by the medical director, and periodically the clinic chief is required to review charts of all physicians. The charts of newly added physicians are reviewed after each session and prob-

lems discussed with them. Under- as well as over-utilization of the facilities and lack of adherence to administrative procedures when found are discussed with the physicians involved. The staff is urged to remember that the Center must operate within a budget, but the Board of Directors insists that the budget not stand in the way of providing all procedures and services deemed necessary to establish a diagnosis or to provide proper treatment within the scope of benefits available.

A clinic chief is available during clinic sessions to assist the staff with unusual problems in diagnosis, treatment and administrative matters. The clinic chiefs are board-certified internists, well seasoned both professionally and administratively.

Medical staff conferences are held about four times a year. The subjects are selected by a program committee, and, after the scientific session and before the collation, the medical director discusses administrative problems.

Comparison of Services

The above description of the Sidney Hillman Health Center is the same almost in entirety for the other three Amalgamated centers. Variations are as follows:

The center in Philadelphia and the Laundry Workers Center are new buildings specifically constructed as medical centers. In the three centers, the union members do not contribute toward the annual operational costs because as a result of collective bargaining the employers have agreed to pay a percentage of payroll sufficient to cover the full operating costs. Philadelphia provides for several types of psychiatric therapy and diagnostic dental consultations when deemed a necessary part of the medical work-up. Some centers have general physicians providing the nonspecialty services; others have specialty board-qualified and board-certified physicians providing the general services.

The physician's rate of pay per hour varies from $6.25 for the general physicians and $7.75 for specialists in the Sidney Hillman Health Center of New York City to a maximum of $10 per hour for specialists in the other centers. Some centers provide for a minimum of fringe benefits, and others provide the full range including vacation time, sick leave, and other social security benefits.

As of the end of the last recorded fiscal year of all centers, an aggregate total of 70,737 of the eligible group of 95,000 persons were registered at least once since the centers were established. In the last fiscal year, a total of 25,507 newly and previously registered members were served in all four centers. The following services were provided during the last fiscal year in all of the centers:

Physicians services	217,791
Diagnostic procedures	171,799
Therapeutic services by podiatrists, nurses, technicians and other paramedical personnel such as physical therapists, social medical service counselors, nutritionists, and pharmacists	222,121
Total of all services	611,711

Variations in the average number of services per patient in each of the centers were as follows:

SHHC of Philadelphia	22.0
SHHC of New York	23.7
Amalgamated Laundry Workers HC of New York	25
SHHC of Chicago	29.5

The total number of physician hours necessary to provide the physician services in all centers was 53,122, or an approximate average of 15 minutes per service.

At the Sidney Hillman Health Center in New York, the ratio of services provided by general physicians and by specialists was almost 1:1, and the same ratio existed for the hours for the two categories.

The above data provide a rather limited view of the total services provided. Detailed reports and descriptions can be obtained from each of the center's medical directors.

Motivation of Direct Service Program

Before closing, it would be interesting to discuss the reasons for the establishment of these direct-service programs by the Amalgamated joint boards. The basic reason was the knowledge that many members and their families were obviously in need of a great deal of preventive, diagnostic, and therapeutic medical care which they were not receiving. The unknown and unpredictable high and rising cost of modern medical care was a financial barrier.

The joint board leaders recognized that poor health contributed greatly to a worker's economic insecurity. Proper medical care was of primary concern to the worker because illness meant loss of pay and savings. With little savings and resources bounded by the weekly pay envelope, an incapacitated worker was constantly threatened by debts to meet doctors' bills and other medical expenses.

It was with this knowledge that the joint boards devoted their energies to establishing a program of medical care for the clothing worker that would lessen the fear of ill health that was always present. The establishment of these direct services has made available not only diagnostic and therapeutic services when needed but also preventive services; it has provided for

a professionally and administratively integrated program within the framework of group practice technique; it has provided for a mechanism to control fiscal policies so that more services can be purchased per fund dollar; it has provided for professional supervision of the quality of medical services; and it has given the workers a sense of ownership in their Center where they and their dependents receive without undue delay personalized attention in a pleasant atmosphere. The inherent principle which motivates the sponsors of these programs was well stated by Kenneth Morse, who said:[2] "Health is man's greatest asset, without it his ability is seriously impaired. To the worker, health determines his opportunity to capitalize on his commodity, namely his skill. It is his beacon in his pursuit of happiness."

Thus, in three major American cities there are now thousands of Amalgamated workers and their spouses who have available to them medical services which are much more than just professionally adequate because the programs are theirs—in their centers—and supervised by people who are devoted to their interests and well-being.

Summary

In order to meet the nonoccupational medical needs of their employees, the Amalgamated Clothing Workers of America Union and employer associations in four cities have established centers to provide their ambulatory members and dependents with preventive, diagnostic, therapeutic, and rehabilitative medical services. The union members and their dependents are also covered for hospitalization and in-hospital surgical care through a nationwide self-insurance fund. The medical centers cooperate fully with the in-plant physicians and nurses in the shops.

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Acknowledgments

Grateful appreciation is extended to the medical directors of the other health centers—Dr. William Hoffman (Sidney Hillman Health Center of Chicago), Dr. Joseph Langbord (Sidney Hillman Medical Center of Philadelphia), and Dr. Julius Schwimmer (Amalgamated Laundry Workers Health Center of New York City)—for their cooperation in providing necessary information.

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"Psychogenic" Pain

George L. Engel, M.D., Rochester, N.Y.

PAIN IS a cardinal manifestation of illness, and the relief of pain is probably the most common demand made by the patient upon the physician. In spite of this importance of pain, it is astonishing how little we understand pain, but how confident we are of our knowledge of pain. When a patient complains of pain, it is taken for granted that pain end organs somewhere in the body are being stimulated. That this often proves to be the case provides support to those who hold this centripetal point of view. When no such explanation is found, it is assumed that a pathological process is there nonetheless, but simply has not yet been discovered. Rarely this too proves to be so. Or it is postulated that something is affecting the nerves ("neuralgia") or the nerve pathways, or even the thalamus, producing so-called "central" pain. And if no other explanation is forthcoming, the patient is told in one way or another that his pain is "imaginary," often meaning that the physician does not believe it exists. In more recent years the term "psychogenic" pain has come into use and is generally applied *par exclusione* to those instances in which no other cause of pain can be demonstrated. For many this is a vague and mysterious concept since the commonly accepted concept of pain provides no room for such a notion. How can there be pain if pain end organs are not being stimulated?

Perhaps we need to start by asking: What is pain? A definition of pain is elusive at best, if possible at all. As observers we cannot even recognize pain. Indeed, pain can only be experienced, and for our information about pain we are totally dependent upon the report of the person experiencing it. This is different from some varieties of experience, such as vision or hearing, where what impinges on the sense organs can also be experienced by other observers and hence some consensus can be achieved as to what was seen or heard. But occasionally individuals may report seeing or hearing things in the absence of recognizable visual or auditory stimulation. One thinks at once of dreams, hallucinations and phenomena provoked by drugs. I make these points to emphasize that where it is possible to verify the presence or absence of a peripheral source of stimulation in studying sensory experiences, the physician has no difficulty in identifying examples in which no peripheral stimulation takes place even though the patient experienced sensation. Arguing by analogy alone, I contend that the same must also hold true for pain.

What significance, then, are we to attach to the undoubted fact that there are pain pathways and that pain *can be* evoked by stimulation of parts of the body that are so innervated? Certainly it makes clear that in whatever manner we may conceptualize pain, one way in which it can be evoked is by the appropriate stimulation of this peripheral sensory system. This does *not* justify the additional, usually inferred, postulate that pain can *result only* from the stimulation of such pathways. But it does permit us to study and to identify characteristics of pain which are dependent on the neurophysiological characteristics of the peripheral system, an important consideration since this enables us to identify, for example, a pain process originating in muscle as compared to skin. The peripheral distribution of pain-sensitive receptors has another importance in terms of how the individual's concept of pain develops. Pain belongs to the systems concerned with protecting the body from injury. We may assume that from birth on the individual builds up a library, so to speak, of pain experiences, originating from the variety of peripheral painful stimulations which he experiences in the

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course of his life. From the developmental side we presume that the capacity to experience pain develops from numerous peripherally induced experiences but thereafter pain experience, like visual or auditory experience, may occur without the corresponding stimulation of the end organ.

There are still other reasons that compel us to question the purely centripetal concept of pain. How does the sufferer know whether or not he has pain? Obviously *consciousness* and *attention* are necessary. Actually, the most successful techniques for relieving pain, namely, general anesthesia and hypnosis, are not directed to pain per se but to consciousness and/or to attention.

Now, how do we know "pain" when it reaches our attention? We know it only by its quality and from this point on language fails us. We can only describe it in terms of experiences which evoke pain. Thus we may describe it as "sharp," thinking of a cut or a quick blow, or "dull," thinking of some slow pressure, as "burning," "tearing," or like a "pin-prick" or a "toothache," and so forth. Obviously these are not descriptions of pain—these are descriptions of circumstances under which pain actually was experienced, or our imagination of how it would feel, were something of this sort to be experienced.

When we scrutinize more carefully the identifying quality of pain we note that it includes an affective tone. Pain is never neutral. It is usually unpleasant, but it may also be pleasant, if only in a relative sense. This affective quality brings pain into a central position in terms of psychic development and function. Thus pain acquires special meanings for the individual as follows:

1. Pain warns of damage to or loss of parts of the body, and is part of the system for protection of the body from injury. It is, therefore, intimately concerned with learning about the environment and its dangers on the one hand, and about the body and its limitations on the other. We presume that what causes pain and the part that hurts are permanently registered in the central nervous system.

2. In terms of development, pain is very much involved in human relationships (object relations). From infancy, pain leads to crying and to a response from the mother or some other close person. The association of pain—crying—comforting by a loved person—relief of pain, is an important determinant of tender love relations and helps to explain the "sweet pleasure" of pain. It is not the pain that is pleasurable, but the anticipation of reunion with a love object and the relief of the pain that are enjoyed. Certain individuals function as if the pain is worth the price.

3. Early in childhood, pain and punishment become linked. This establishes another communication between the child and adults, namely, pain is inflicted when one is "bad." Pain, thus, not only may come to signal that one really is "bad," thereby a signal for guilt, but also pain may become an important medium for expiation of guilt. Some children as well as adults welcome pain if it means expiation and forgiveness and, hence, reunion with the loved one. If pain serves to relieve guilt, pleasure in a relative sense is again involved.

4. Pain also early becomes very closely associated with aggression and power. The child quickly discovers the effects of inflicting pain on others and on himself. We will learn how by suffering pain one may control one's own aggression.

5. Closely related to the preceding is the connection between pain and real, threatened or fancied loss of loved persons. Especially when there is also guilt for aggressive feelings toward such persons, pain may provide a psychic means of expiation. The patient succeeds in reducing the feeling of loss by experiencing a pain in his own body which he then substitutes for the lost person.

6. Pain may also be associated with sexual feelings. We know that at the height of sexual excitement pain may not only be mutually inflicted but actually enjoyed. When this becomes the dominant feature of the sexual activity we recognize it as a perversion, sadomasochism. But we will also discover some persons who prefer to experience pain rather than have sexual experience, the latter existing only at the level of unconscious fantasy.

When we examine the full gamut of circumstances, from the simple peripheral stimulus to the complex psychological components, we must acknowledge that pain, in the final analysis, is a psychic phenomenon. The two-component concept of pain, which speaks of pain sensation and the reaction to it, is misleading because it implies that pain can originate only from a "pain" receptor. Gooddy[1] suggests that disordered patterns (rate, amplitude, time and space) in nerves or neural centers provide the neurophysiological conditions which may be experienced as pain, but they do not by themselves account for pain. Certain characteristics of the impulse patterns may influence the quality of pain, but they will not in themselves determine that it be pain. This certainly is consistent with the clinical observation that one can identify qualities associated with colic, for example, as differentiated from a toothache,

qualities which arise from the properties of the particular anatomical system giving rise to the disordered impulse patterns.

This brings us then to "psychogenic" pain. Clinical observation reveals that there are individuals who seem to experience pain with unusual intensity and frequency. With peripheral lesions they seem to suffer more pain than most people do but often they suffer pain without any peripheral process. Among such patients the presence or absence of a peripheral disorder is not well correlated with the presence or absence of pain. Indeed, we often find that the discovery of the lesion and its removal or cure does not alleviate the pain, which may persist or even recur at a later date. In other words, what we are leading up to is that there are certain individuals whom we shall call "pain-prone," among whom psychic factors play the primary role in the genesis of pain, in the absence as well as in the presence of peripheral lesions.

Clinical psychologic studies of many pain-prone individuals have by now provided us with a fairly good understanding of the determinants of this susceptibility to suffer pain.[2-8] The key comes through understanding how pain may yield pleasure. It is pleasure in a relative sense, that is, in place of something even more distressing.

The Clinical Problem

Let us now examine pain in terms of the problem as it is actually encountered by the physician, namely, a patient seeks medical aid because he is suffering from pain. I propose that we approach each patient with the following questions in mind.

1. Are there pathological processes affecting nerve endings and leading to disordered patterns in nerve pathways which are being experienced as pain?

2. If such processes are present, can the character of the pain experience reported by the patient be fully, partially, or not at all accounted for by the distinctive characteristics of the peripheral, pathological process?

3. How are psychological processes operating to determine the ultimate character of the pain experience for the patient and the manner of communication of this to the physician?

All three questions acknowledge the principle that a peripheral factor may or may not be operating and that, when it is operating, it may not fully account for the pain experience. Further, they permit us to explore in more practical clinical terms the precise criteria which should enable us to make accurate interpretations.

The Description of the Pain

The Peripheral "Signature"

The relatively good concordance among individuals as to the kinds of pain associated with particular pathological processes gives us our first clue as to what differentiates the peripheral contribution to pain experience from the rest of the pain experience. Gooddy spoke of "disordered patterns," referring to rate, amplitude, time and space, and we immediately recognize that what enables us to identify a particular pain experience as being associated with myocardial ischemia or renal colic concerns how the specific anatomic and physiologic characteristics of the diseased part gives rise to these disordered "patterns." Once we understand the anatomy and physiology of the structure involved, we can also predict that certain movements, postures and behaviors of the patient are chosen because they are associated with pain amelioration while others are avoided because they are associated with intensification of the pain. The precise elucidation of such correlations between anatomical and physiological characteristics, on the one hand, and pain experience on the other hand, provides the most certain evidence that processes originating in the periphery are initiating a particular pain experience. Conversely, deviation from these understandable anatomical and physiological principles should immediately alert the physician that peripheral disordered patterns either play no role or their influence is being obscured by other factors. The incongruity between the pain characteristics as described by the patient and the known pathophysiological and pathoanatomical processes is in itself sufficient grounds to question the accuracy of the interpretation which explains all on the presence of the allegedly demonstrated peripheral disorder.

The Individual Psychic Signature

As we listen to the patient's account of his pain, we first attempt to detect and identify pain qualities associated with stimuli arising from the periphery. All the other features of the pain description are understandable in terms of what we might call the individual's "psychic signature," as contrasted to the "peripheral signature." What are some of the varieties of pain description that are not understandable in terms of a peripheral process, even when the latter is present I have already mentioned discrepancies in respect to what would be predicted from anatomy and physiology. We need to pay attention to pain location in terms of the patient's concept of his body image as

contrasted to pain location determined by the distribution of nerves. Patients' private concepts of how their bodies function may influence their description of pain. For example, the person who entertains an autointoxication theory may get pain relief from cathartics or colonic irrigations, such relief not indicating in any way colonic disease. The intensity of pain reported by patients is a highly individual matter. Clinical experience is a useful guide but, in general, gross deviations in either direction inform us more of the psychic state of the individual than of the existence or nature of a peripheral lesion.

In general, the more complex the ideation and the imagery involved in the pain description, the more complex are the psychic processes involved in the final pain experience. In part, this is a function of reality testing. When the pain experience is initiated from the periphery and this is the primary factor responsible for its presence and where the function of the pain is to signal to the patient damage or injury to a part of his body and nothing else, then the pain description is likely to be economical and relatively uncomplicated. Terms such as "sharp," "dull," "aching," "throbbing" and the like are relatively easily applied and the relationship to physiological processes relatively easily identified by the patient. On the other hand, very vague descriptions as well as more elaborate imagery are reflections of the degree to which the pain is entering in pyschic function in a more complicated fashion, now serving purposes far beyond the simple nocioceptive function. While the patient almost always initially presents his complaint as a pain, an ache, a headache, backache, etc., request for elaboration will usually bring out more vague or more elaborated description. More vivid are descriptions as "being jabbed with an ice pick," "burning like a red-hot coal," "bruised and torn," "like my face is being eaten up," "electric shocks burning me," "just too horrible to describe," and so forth. Or "headache" may become " a sort of pressure as if the top of my head would come off." A backache may become, "a pulling or drawing as if the cords of my back were being pulled at." Sensations described as boring, gnawing, biting, penetrating, crawling, twisting and tearing are particularly meaningful.

Now these varieties of description are extremely valuable in identifying the presence or absence of a peripheral process. In general, however, while we can be fairly confident of a peripheral lesion when the description is *not only* crisp and economical *but also* concordant with anatomical and physiological processes, we cannot conclude that the patient who gives us the more complex, the vague, or the vivid type of description does not have a peripheral lesion. Such descriptions reflect the characteristics of the individual and if he is suffering from a peripheral lesion, the disordered patterns arising from it are subjected to the most complex psychic distortion and elaboration so that at times the peripheral qualities may be totally obscured.

This now brings us to explore the characteristics of patients disposed to use pain in this fashion and the circumstances that lead them to do so. For convenience we shall refer to them as "pain-prone" patients.

The "Pain-Prone" Patients

For the most part these patients repeatedly or chronically suffer from one or another painful disability, sometimes with and sometimes without any recognizable peripheral change. Such patients, by no means, constitute a homogeneous group and yet they have many features in common.

The Choice of Pain as Symptom: Pain as Punishment

Guilt, conscious or unconscious, is an invariable factor in the choice of pain as the symptom, as compared to other types of body sensations. Clinically we should expect to find either a long-term background of guilt and/or an immediate guilt-provoking situation precipitating the pain. The clinical characteristics of the chronically guilt-ridden person are not difficult to recognize if one appreciates the role of penitence, atonement, self-denial and self-depreciation as means of self-inflicted punishment to ease the feeling of guilt.

Many of these individuals are chronically depressive, pessimistic and gloomy people whose guilty, self-depreciating attitudes are readily apparent from the moment they walk into your office. They seem to have had no joy or enthusiasm for life and, indeed, some seem to have suffered the most extraordinary number and variety of defeats, humiliations and unpleasant experiences. You may first be inclined to pass this off as a consequence of the pain they are suffering or as just a matter of bad luck. But it quickly becomes apparent that many of these difficult situations have either been solicited by the patient or simply not avoided. They drift into situations or submit to relationships in which they are hurt, beaten, defeated, humiliated and, to our astonishment, seem not to learn from experience; for no sooner out of one bad spot they are in another in spite of

the most obvious danger signals. At the same time they conspicuously fail to exploit situations which should lead to successes and, indeed, when sucess is thrust upon them they do badly. This provides the clearest proof that these characteristics are not the result of the pain, for we note often that it is just when life is treating them worst their physical health is likely to be at its best and they are free of pain. Paradoxically, when things improve, then a painful symptom may develop. Unconsciously they do not feel they deserve success or happiness and must pay a price for it. Even though they complain of the pain, for then the pain is almost a comfort or an old friend. We are often struck by the disparity between the intensity of the pain and suffering they describe and their general appearance of well-being. Some patients may describe a terrible pain with so little evidence of current suffering that you may be surprised to discover that they are speaking of a present pain. This stoical behavior may express the need to see oneself and be seen as a martyr who tolerates suffering. Other patients display intense suffering, behavior which also has psychic determinants, including a need to appear as the suffering person, to be pitied, or to be succored.

Many of these patients are unusually tolerant of pain inflicted upon them by nature or by the physician in the course of examination and treatment. In their histories we discover an extraordinary number of injuries and operations and more than the usual number of painful illnesses and pains, the latter usually described in medical jargon as "pleurisy," "kidney attacks," "appendicitis," etc. Careful history will usually render doubtful that such terms actually correspond with the diagnosis in more than a few instances. We soon realize that what many of the patients solicit from us is the infliction of further pain, usually in the form of surgery or painful diagnostic or therapeutic measures. Treatment that is not painful or a hardship may be rejected. Physicians may be surprised at how well these patients tolerate painful procedures. Indeed, the patient who is very fearful of such painful procedures is not likely to be found among this group at all.

The following cases are illustrative:

A 61 year old man suffered on and off for 25 years from intense pain in the region of the right ear. This lasted several days at a time and was described as "raw and burning." The patient's mother died when he was 7½ years old. Father and stepmother treated him harshly, and "boxing the ears" was a frequent punishment from both, a procedure to which he submitted passively, although his younger brother did not. Characteristic of this man was that he allowed himself to be struck by his father until his 21st birthday, feeling that he had no right to protest until he was legally an adult. However, he did not leave home until he was 26 and up to that time contributed the major share of his earnings to his father. Face pain began about this time.

Although of superior intelligence, he did heavy manual labor for many years. Later he went into business with a partner. The business was a success, but his partner soon cheated him of all the profits and he ended up losing everything. Like other events in his life, he accepted this without a struggle.

Six years before examination, he suffered a myocardial infarction and since then has experienced severe, intractable angina pectoris decubitis. The face pain became less from that time on.

With many of these patients we will be struck by the dramatic fashion in which they describe both the hardships of their lives and the extent of their suffering from pain, illness, and the slings and arrows of misfortune. Indeed, this very dramatic quality and the relish with which they recount the story, often an almost unbelievable one, should immediately alert the physician that this is a person for whom pain and suffering are unconscious sources of gratification.

The Development and Backgrounds of the Pain-Vulnerable Patients

For practical clinical purposes, it is usually not necessary to elucidate all the factors predisposing to these developments. Suffice it to say that we often find that aggression, suffering and pain played an important role in early family relationships. It is consistent with their psychological characteristics that these patients readily provide the physician with such information if he only indicates his interest to hear it. This eagerness to tell of such distressing life experiences is in itself of diagnostic value and it is not of crucial importance whether such descriptions are factual or fanciful. In either event, the fact and manner of telling betrays the wish of the patient to present himself as long-suffering and abused.

A 32 year old married woman had cruel, impulsive parents. The father was a chronic alcoholic and the mother unpredictable and sadistic. She had vivid memories of being hit hard across the face and back by both parents. Mother would slap her face suddenly and without warning as insurance against future misdeeds. When the patient was 7, all of mother's teeth were extracted; the patient remembers the severe face pain suffered by the mother.

A 34 year old married woman at age 5 witnessed the death, by accidental burning, of her 2 year old sister. This little girl's clothes caught fire from a wood stove and her face badly burned. Later the parents separated and the patient was placed with an older couple. The foster mother frequently beat her about the face and head and pulled her hair. The patient said, "I often think of her when I have my pains."

Under What Circumstances Does the Pain Occur?

Many of these people have had repeated episodes of pain, so that this question has two aspects: When did the patient first have pain and when did each episode occur? Quite a number have their first significant painful syndromes in adolescence. This is especially so among the women patients whose story may begin with painful menarche, dysmenorrhea or headaches, especially premenstrual. A very important clinical finding is the history of "appendicitis" and appendectomy. These episodes do not fit the usual clinical picture of acute appendicitis, involving usually chronic or intermittent abdominal pain of quite varied nature and severity, sometimes associated with a variety of other symptoms. Such attacks usually begin in the age range of 14 to 18 years, eventually leading to an appendectomy. Where surgical records are available, we find the appendix reported as "normal" or "chronic appendicitis." Curiously, this pain usually disappears after operation, although it may soon be replaced by other pains often related by the patient and some physicians to the scar or to adhesions. This "appendix" syndrome is much more common among girls than boys and its presence in the past history provides a valuable clue for the interpretation of later pains.[9]

We may now consider some of the circumstances under which individual episodes of pain may occur, remembering that this may also include pain precipitated by unconsciously motivated accidents or injuries.

1. *When External Circumstances Fail to Satisfy the Unconscious Need to Suffer*—Some patients develop pain when things go well. These are always individuals with an exaggerated need to suffer who may remain relatively pain-free as long as external circumstances make life difficult. When the environment does not treat them harshly enough or they cannot get it to do so, then it seems almost as if they inflict pain upon themselves.

A 32 year old woman married to a brutal, alcoholic man who frequently beat her and the children and who provided for her most inadequately, struggled hard to maintain herself. She began to suffer a series of painful disabilities when her husband underwent a religious conversion, gave up drinking, and became a model of a conscientious and considerate husband and father. Just when she had everything to live for, her pain prevented her from enjoying it.

Such precipitating circumstances are easily overlooked if the physician fails to recognize that for certain persons, success and good fortune are stressful in that they mobilize intolerable feelings of guilt.

2. *As a Response to Real, Threatened or Fancied Loss*—Following the death or any permanent loss of a loved person, or during the period of anticipation of such a loss, the survivor may develop pain during the period of mourning and sometimes on anniversaries of the mourning. Szasz[7] has pointed out how the mourner may take a part of his own body as a love object in place of the lost person and, by experiencing pain in this part, symbolically assure himself of its continued presence. Pain is especially likely to be the symptom if there is also a strong element of guilt, most often related to ambivalence toward the lost person.

A 42 year old Negro woman had a brief attack of sharp pain in the left anterior chest. In the interview she almost immediately began to speak of how upset she had been since the shotgun murder of her brother-in-law 1 week earlier. He was shot in the left chest. His body was taken South for burial, but she had to remain home to care for the children. She cried when thinking or speaking of this event. She greatly admired and was very fond of this man who was a stable and successful man in the community. In contrast, her husband (the victim's brother) was irresponsible and abusive. In fact, exactly one year earlier, while drinking, he brutally beat her and then threatened to shoot her with a shotgun. She averted this by clutching her infant to her chest and then jumping out the (ground floor) window. She preferred charges against him and he was currently on probation. Further interview strongly indicated a guilty wish that the victim had been the husband rather than his brother.

While many episodes of pain occur in direct relationship to the loss of a loved person, as in this case, many more occur in relation to threatened losses, anniversaries of losses, or fancied losses. Thus we may find pain developing in relationship to the illness or impending departure of important family members or friends, where the patient responds with, or had previously experienced aggressive feelings toward such persons. Or the patient may experience the loss or its anniversary as a painful reminder of guilt and actually suffer with it in the form of pain.

3. *When Guilt Is Evoked by Intense Aggressive or Forbidden Sexual Feelings*—There are some individuals for whom any expression of aggression is unacceptable and even the threat or possibility that aggression might be expressed provokes guilt. Some of these persons instead experience pain, sometimes without any aggression being expressed and sometimes remorsefully after it has been expressed. After the pain develops, the provoking situation may be forgotten or only vaguely remembered, or the patient may recall it remorsefully, consciously accepting the pain as a punishment and as a warning against future expressions of aggression. Some patients will observe that

they get their pains if they don't control themselves.

A 32 year old woman who had had ulcerative colitis was compulsively clean and always kept close rein on any expression of aggression. Her 2½ year old son defecated in his crib and smeared the feces. She became furious and immediately spanked him. A few hours later she developed a severe headache. She felt remorseful for her outbreak of temper and resolved not to do so again. The headache was considered a deserved punishment.

When the provoking situation involves sexual impulses, these, in contrast to the aggressive impulses, are almost always at an unconscious level and must be inferred by the examiner. In general, they involve situations which might normally be expected to be sexually exciting, but are not so recognized by these patients, who instead experience pain; or more subtle situations in which the precipitating stimulus has special symbolic meaning to the individual, generally reminiscent of some childhood sexual conflict.

A 26 year old woman with a variety of hysterical manifestations had several episodes of pain and burning at the end of urination. One episode occurred during her first year of marriage. Her husband proved less capable sexually than she hoped for and she felt both frustrated and angry. As a child the bathroom was the scene of many sexual fantasies and of masturbation, which included poking in and around the urethra.

The Location of the Pain

The patient usually describes the pain as occurring in some part of his body, whether it originates there or not. When no peripheral factor is operating, the patient still assigns a location to the pain. This choice of site of the pain is determined by one or more of the following:

1. *A Peripherally Provoked Pain Experienced by the Patient Sometime in the Past*—In essence the patient revives unconsciously a past pain experience and suffers again from pain of the same character and in the same location as the original pain. This may be the pain of a past injury, an operation, or any physical disorder which had occurred at a time when the pain could fulfill, directly or indirectly, a psychic regulating role for the patient. It may have been punishment or it may have been the vehicle whereby a relationship was reestablished. Some postoperative and post-traumatic pain syndromes are of this sort.

A young man had repeated bouts of severe, searing, shocks of pain in his right forehead. These came on with explosive suddenness, sometimes associated with a sensation of flashing light and staggering, and were followed by a dull, throbbing pain of growing intensity. When he was 12 years old, he prepared a home-made bomb, one of numerous aggressive acts unconsciously directed toward his stern and punitive father. The bomb exploded prematurely and he suffered a depressed skull fracture, as well as the loss of several fingers of his left hand. He felt extremely guilty and considered the accident a deserved punishment. The location and character of the head pain exactly duplicated the original accident. The pain characteristically occurred in settings in which anger toward authority figures was blocked by guilt. Sometimes he could terminate the pain by an attack of blind destructive fury against some inanimate object, such as a piece of furniture.

2. *A Pain Actually Experienced by Someone Else or a Pain the Patient Imagined or Wished the Other Person Experienced*—This is perhaps the most common and the most important determinant of the site of the pain. It involves several important psychologic mechanisms. First of all, the other person is important to the patient and one with whom the patient is in some (usually unconscious) conflict or from whom he has been or may be separated. Secondly, it involves the psychic mechanism of identification, meaning that the patient unconsciously becomes like the other person, notably in terms of suffering like him. We have already mentioned real, threatened or fancied losses and guilt for forbidden impulses as precipitating factors. We can now add that the location of pain may be determined by the real or fancied location of pain in the other person(s). It must be emphasized that this is unconscious. The patient is unaware of a connection between his pain and the pain of the other person and if directly questioned will never consciously make the connection, although he may unconsciously reveal it by word or gesture. On the other hand, if the physician meticulously explores the pain and illness histories of all the important persons in the patient's life, he will usually uncover without much difficulty the model for the patient's pain. To do this the patient is asked to describe the symptoms of each person, paying particular attention to the patient's idea of the pain.

A 42 year old man complains of severe stabbing pain in the region of the left nipple. This occurred while he was out hunting, and was just taking aim at a buck deer. He felt fearful, and had difficulty breathing, became lightheaded and collapsed. The patient's father had died of a "heart attack" the previous fall. The medical student who took the history assumed that the patient knew his father's pain had been substernal. When asked where his father's pain was the patient said, "I don't know" but pointed to the region of his own pain.

Sometimes we know the other person's illness to be painless, only to discover the patient thought otherwise.

A 41 year old unmarried woman, a teacher, lived with and took care of her ailing mother for many years until her death 1 month before the beginning of the patient's

face pain. She slept in the same bed as mother. The night of mother's death she awakened to find that the mother's right face was drawn and a short time later it became blue. She was breathing heavily and the patient *believed* her to be suffering great pain. She called for help but when unable to secure any, climbed back into bed only to realize that mother was dead. She had been engaged to a man for many years but did not marry because she could not leave her mother. However, upon mother's death, she felt emancipated, bought a house, but then developed pain in the right face and on that account she gave up both her home and fiance. She expressed remorse at her feelings of emancipation after the mother's death and consciously considered the pain as punishment, a sign that she was being inconsiderate of her mother's memory.

Sometimes the site of the pain is determined by a conscious or unconscious wish that the other person suffer pain. This may have appeared only as a fleeting thought or may not have been associated with the person at all.

Psychiatric Diagnosis

While similar psychodynamic features may operate, these patients do not constitute a homogeneous group in terms of psychiatric nosology.

1. *Conversion Hysteria.* The largest number of these patients satisfy the requirements for the diagnosis of conversion hysteria and their histories usually reveal many other conversion symptoms, such as globus, fainting, aphonia, sensory or motor disturbances, etc. They manifest the relative indifference to or exaggerated display of symptoms, as well as the dramatic, exhibitionistic, seductive or shy behavior so common among hysterics. They are suggestible and may have intense emotional involvements with the physician, often associated with dramatic remissions and relapses of symptoms. To varying degrees they may have been involved in acting out behavior, including drinking, use of drugs, and sexual promiscuity. The men patients are often relatively passive and have feminine identification, usually with the mother.

2. *Depression.* Another group of patients suffers predominantly from depression. The generally depressed appearance, the retarded or agitated behavior, the content of speech, the expressed affects of sadness, guilt and shame, all identify the depression and this is usually documented by history. Some patients, it will be found, have had previous episodes of depression without pain and some are the chronically gloomy and depressive characters already described. A common error by the physician is to assume that the patient is depressed because he has pain. Investigation will usually make clear that the experience of pain serves to attenuate the guilt and shame of the depression. Indeed, in some instances the pain is clearly protecting the patient from more intense depression and even suicide. This group of patients in particular may become addicted to drugs.

3. *Hypochondriasis*—The hypochondriacal patient experiences and communicates his pain or other body sensations in a distinctive way. One quickly notes its peculiarly intense and persistent quality. It may not be as severe as it is inescapable, annoying and bedeviling, and the patient is made desperate by the pain. As the physician listens to the patient's description, he immediately notes the urgency with which the patient seeks relief and his tremendous concern as to what the pain means. He often seems more concerned with the interpretation of the pain, is it cancer or some terrible infection, than with the pain per se, and he is little or not at all reassured by the doctor's examinations. There is often a distinct quality of being persecuted by the pain. At the same time it will be found that the patient lavishes all varieties of attention and care on the painful part, somewhat in contrast to the relative indifference of the hysteric or the long-suffering attitude of the depressive. Some of these patients are prepsychotic.

4. *Schizophrenia*—Closely related to the hypochondriacal patients are those who are psychotic and whose pain constitutes a delusion. Many of these patients are not recognized simply because their presenting complaint is pain. But the alert physician will note the following qualities. The patient truly feels persecuted by his pain and he seeks help with a desperation that is impressive. It is not so much that it is painful as that it is unrelenting, annoying, and inescapable. The description of the pain may include bizarre ideas which are expressed as vivid analogies or as actualities. Patients express convictions that certain extraordinary changes have taken place in their bodies, the very bizarreness of which makes their delusional quality evident. Such patients usually manifest other paranoid qualities, including suspicious accusations against other physicians as being responsible for the pain. Or they may ascribe the pain to various outside influences, including rays and vibrations. An important clinical point is the patient's tendency to associate the pain with nasal or rectal difficulties. Indeed, these patients often first approach otolaryngologists or proctologists, or may have sought treatment with colonic or nasal irrigations. The diagnosis will rarely be overlooked if the patient is given sufficient opportunity to present his explanation for the pain. This usually proves to be a complicated delusional concept.

Summary

The general principles formulated in this paper may be summarized as follows:

1. What is experienced and reported as pain is a psychological phenomenon. Pain does not come into being without the operation of the psychic mechanisms which give rise to its identifiable qualities and which permit its perception. In neurophysiological terms, this also means there is no pain without the participation of higher nervous centers.

2. Developmentally, however, pain evolves from patterns of impulses arising from peripheral receptors which are part of the basic biologic nocioceptive system for the protection of the organism from injury. The psychic experience *pain* develops phylogenetically and ontogenetically from what was originally only a reflex organization. This may be compared to the necessity for functioning eyes and ears to receive light and sound waves before the complex psychic experiences of seeing and hearing can evolve.

3. Once the psychic organization necessary for pain has evolved, the experience *pain* no longer requires peripheral stimulation to be provoked, just as visual and auditory sensations (hallucinations) may occur without sense organ input. When such are projected outside the mind (in contrast to a painful thought or a painful frame of mind), they are felt as being in some part of the body and are to the patient indistinguishable from pain arising in the periphery.

4. Since the experience *pain* and the sensory experiences from which it evolves are part of the biologic equipment whereby the individual learns about the environment and about his body and since this has a special function as a warning or indicator of damage to body parts, pain plays an important role in the total psychologic development of the individual. Indeed, pain, along with other affects, comes to occupy a key position in the regulation of the total psychic economy. We discover that, in the course of the child's development, pain and relief of pain enter into the formation of interpersonal (object) relations and into the concepts of good and bad, reward and punishment, success and failure. Pain becomes par excellence a means of assuaging guilt and thereby influences object relationships.

5. From the clinical viewpoint, we discover that disordered neural patterns originating in the periphery confer certain qualities on the pain experience that permit the physician to recognize their presence and hence make a presumptive diagnosis of an organic lesion.

6. Clinical psychological studies of all varieties of patients with pain reveal that some individuals are more prone than others to use pain as a psychic regulator, whether the pain includes a peripheral source of stimulation or not. These *pain-prone* individuals usually show some or all of the following features:

   a. A predominance of guilt, with pain being a relatively satisfactory means of atonement.
   b. A background that tends to predispose to the use of pain for such purposes.
   c. A history of suffering and defeat and intolerance of success (masochistic character structure). A propensity to solicit pain, as evidenced by the large number of painful injuries, operations, treatments, etc.
   d. A strong, aggressive drive which is not fulfilled, with pain being experienced instead.
   e. Development of pain at times when a relationship is threatened or lost, where the pain serves as a replacement for the loss.
   f. A location of pain determined by an unconscious indentification with a love object, the pain being either one suffered by the patient himself when in some conflict with the object or a pain suffered in fact or in the patient's fantasy by the object.
   g. Psychiatric diagnoses include especially conversion hysteria, depression, hypochondriasis and paranoid schizophrenia, or mixtures of these. Some patients with psychogenic pain do no fit into any distinct nosologic category.

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Autocatalysis of Pulmonary Edema

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PULMONARY edema is a fairly constant postmortem finding in fatalities occurring during unusual smog conditions. These generally involve older people in whom the respiratory reserve is often reduced by emphysema.

We have, on the basis of the foregoing, formulated the premise that certain levels of irritating air pollutants could initiate pulmonary edema which may render certain susceptible persons hypoxemic. The premise further postulates that these susceptible persons have a significant reduction in respiratory reserve as a condition for the development of hypoxia. The hypoxia will engender more pulmonary edema as indicated by Drinker,[1] and thus a vicious circle is initiated which may terminate fatally.

We also visualize that sequestered pulmonary dust deposits may become mobilized and widely dispersed by focal edema[2] and that such liberated dust particles may engender more edema, thereby contributing to the vicious circle.

This report is concerned primarily with the effect of edema upon pulmonary dust deposits.

Method and Materials

In order to obtain some experimental support for this concept, we devised two interlocked experiments. In one of these, 90 rats received intrapleural injections of 10 ml of mineral oil to reduce the pulmonary reserve.

In the second experiment, two groups of 90 rats each were given multiple intratracheal injections of quartz dust and kaolin dust respectively, for a total dosage of 150 mg over a period of six months.

A group of 30 normal rats was given an intraperitoneal injection of 6.4 mg/kg of ANTU (α-naphthylthiourea). The same intraperitoneal dose of ANTU was administered to the animals with oleothorax and to the rats with pneumoconiosis.

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The quartz dust was iron-free and contained 86 ± 4% α-quartz. The average particle size was 2.4 μ. The kaolin dust consisted of 98% kaolinite, and its average particle size was 2.3 μ.

The lungs of the animals were fixed in formalin. After paraffin impregnation, sections were cut, stained, photographed, incinerated, and rephotographed as outlined in previous publications.[3, 4]

Results

The results dealing with the mortality rates of the various groups have been reported previously.[5] Suffice it to say that, whereas ANTU produced a mortality of 27% in normal rats, in rats handicapped by either oleothorax or pneumoconiosis the mortality rate was in the neighborhood of 60%.

Because of increasingly severe silicotic involvement and because of intercurrent pneumonia, nearly 50% of the rats in the quartz dust series had died prior to the injection of ANTU. Within the same time, about 11% of the rats in the kaolin dust series died of intercurrent pneumonia.

Microscopically, in the edematous pneumoconiotic lungs there is extensive transformation of the kaolin dust foci as well as of the silicotic nodules. The sharply outlined dust foci seen in the nonedematous control animals (Fig. 1) are replaced in the experimental rats by foci with indistinct, vague delimitation, foci which are difficult to identify and which fade into the surrounding intra-alveolar edema fluid (Figs. 4 and 7). It is commonly difficult, if not impossible, to differentiate kaolin dust foci from silicotic nodules and vice versa in the presence of pronounced edema.

Normally, as seen in otherwise healthy control animals, kaolin dust foci consist of sharply defined, crowded, large, polygonal pale cells with central small round nuclei, whereas in silicotic nodules the cells are irregularly scattered, poorly delimited, more acidophilic, and with ovoid nuclei (Fig. 1). In the former, the

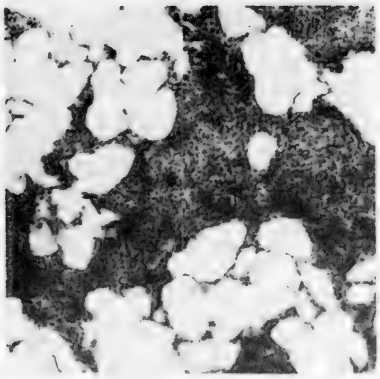

Fig. 1

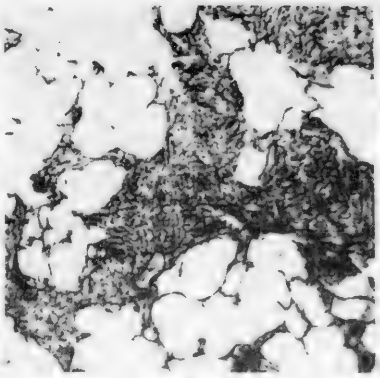

Fig. 2

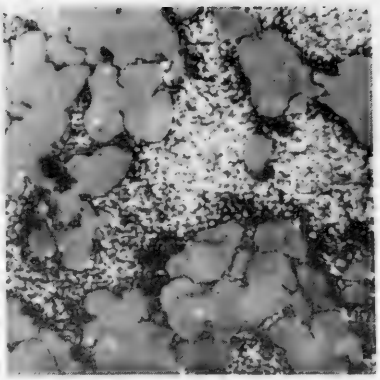

Fig. 3

Fig. 1—Silicotic lesion in a control rat killed six and one-half months after the first intratracheal injection of quartz dust suspension and two weeks after the last of six such injections (total of 150 mg). No ANTU administered. The lesion at this stage is noncollagenous and very cellular. The cell boundaries are ill-defined and the nuclei seem to lie irregularly scattered in a homogeneous matrix. The lesion is sharply delimited and the surrounding air spaces are empty. H. & E. Fig. 2—Reticulin pattern of the above field shows a smallmeshed network of fibers. Method of Gordon & Sweets. Fig. 3—Composite photomicrograph of the above field shows an abundant dust content of the lesion. The mineral is sharply delimited by the outlines of the lesion. (Each of the above illustrations has been reduced approximately one half from magnification × 109.)

stroma is inconspicuous, but it is prominent in the latter. (The concentric architecture of the silicotic nodule seen in the human lung is absent in experimental animals.)

In the edematous lungs, the cells composing the kaolin dust foci are no longer in contact with one another so as to simulate a sheet of cells, and the cell borders are no longer sharp. The cells of an edematous silicotic nodule are swollen, the nucleus more round than ovoid, and the cell borders more distinct.

The reticulin framework within the edematous dust foci has become altered (Figs. 5 and 8). The peripheral delimiting membranes of the foci are irregularly disrupted, and some segments of the circumference seem to be without delimitation. The internal meshwork of fibers shows irregular, dense condensations, enlargement of the meshes, focal pallor and haziness of the fibers, and fragmentations, particularly of condensed portions of the framework.

The intra-alveolar edema fluid is of two kinds: a homogeneous variety the acidophilia of which varies from pale-pink to red and a granular pale-pink type. The latter may contain occasional small pyknotic nuclei, suggesting that the granularity may be due in part to a high-protein content from disintegrating cells.

The edema fluid is found predominantly in the air spaces surrounding dust foci and usually, though not always, contains finely dispersed and larger flocs of dust particles (Figs. 6 and 9). It is interesting to observe an occasional air space filled with fluid devoid of dust yet surrounded by alveoli which contain much dust suspended in edema fluid. Some of the dust foci appear to be nearly or completely depleted of their stored dust.

The mobilization of dust particles from their incarcerating foci and their dispersion throughout the edema fluid is found to be equally severe and widespread in the lungs of control animals that had not received ANTU but that had died of intercurrent pneumonia. It is also true that the dust foci in lung sections of animals that had recovered from ANTU injections are indistinguishable from some of the foci in control animals that had not received ANTU. The dust content of such foci in control rats varies greatly. Some contain no demonstrable dust.

Discussion

Pulmonary edema in pneumoconiotic rats resulted in more than twice the mortality that occurred with the same edema-producing dosage in normal rats. It might be argued that a significant part of the increased mortality in the quartz dust series was related to the effect of pulmonary edema upon an animal with diminished pulmonary reserve, similar to the effect observed in the oleothorax series of animals. This explanation, however, would not be tenable in the case of the rats with kaolinosis, where the lung involvement was considerably less extensive.

We consider the demonstrated predilection of intra-alveolar edema about dust foci, the partial demineralization of dust foci, and the extensive dispersion of mobilized dust throughout much of the edema fluid to be very important findings which tend to support our concept that a rela-

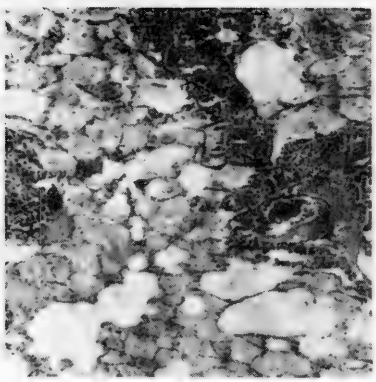

Fig. 4

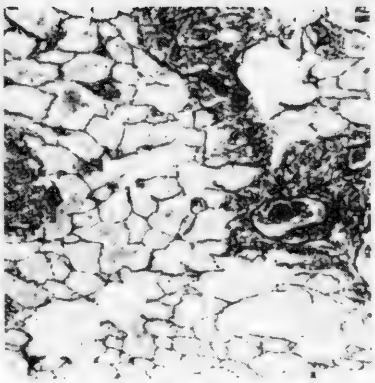

Fig. 5

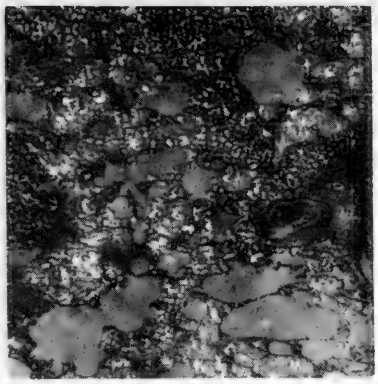

Fig. 6

Fig. 4—Silicotic rat which died less than 24 hours following the administration of ANTU. The last of six intratracheal injections of quartz dust (total of 150 mg) had occurred three weeks previously. There is widespread edema about the silicotic lesion. The latter has lost its sharp definition. The cells now possess distinct outlines and are irregularly separated. H. & E. Fig. 5—Reticulin pattern of the above field shows partial loss of sharp delimitation. There is much condensation of fibers with the formation of irregular clear spaces. Method of Gordon and Sweets. Fig. 6—Composite photomicrograph of the above field shows widespread mobilization of the quartz dust and dispersion throughout the edema fluid. There are several edematous alveoli which are singularly free of dust. The fluid here is more homogeneous and more acidophilic than elsewhere. The concentration of quartz dust is as great in the edematous air spaces as in the original dust deposits. (Each of the above illustrations has been reduced approximately one-half from magnification × 109.)

tively small amount of pulmonary edema may become an autocatalytic process which may terminate fatally when significant pneumoconiosis is present. This concept serves as our explanation for some of the fatalities attributed to the inhalation of smog.

It has been a common experience in our laboratory that when rats are injected intratracheally with about 25 mg of a suspension of very finely divided dust (average particle size 0.2 μ or less) a high mortality will result regardless of the chemical or physical nature of the dust.[6] The mechanism of death is a fulminating pulmonary edema. Because of these observations, we believe that the rapid intrapulmonary liberation of previously sequestered dust particles and their dissemination throughout edema fluid will cause the production of more edema in a manner similar to that of an intratracheal injection.

Because of our greater interest in the microscopic features of the dust and edema distribution, we did not attempt to quantitate the edema. (This cannot be done without foregoing

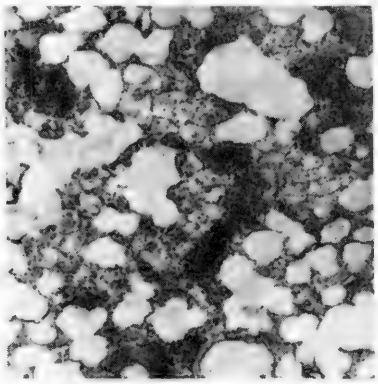

Fig. 7

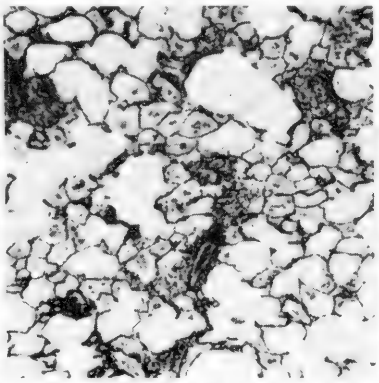

Fig. 8

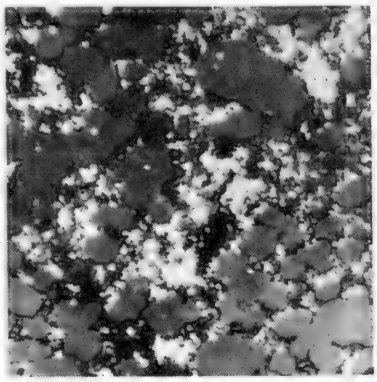

Fig. 9

Fig. 7—Rat with kaolinosis which died less than 24 hours following ANTU administration. The last of six intratracheal injections of kaolin dust had been given three weeks previously (total dosage of 150 mg). The dust foci are ill defined and are indentified by the increased cellularity of some of the edematous regions. H. & E. Fig. 8—Reticulin pattern of the above field shows loss of outlines of the dust foci, irregular condensation and fragmentation of the fibers with the formation of numerous irregular clear spaces within the foci. Method of Gordon & Sweets. Fig. 9—Composite photomicrograph of the above field shows widespread dispersion of kaolin dust throughout the edema fluid. The dust foci appear still to contain abundant mineral dust. (Each of the above illustrations has been reduced approximately one-half from magnification × 109.)

the pathology examination.) In order to buttress our hypothesis according to which pneumoconiosis may convert a sublethal pulmonary edema into a lethal one, it is desirable to determine that there is a greater amount of edema in the lungs of pneumoconiotic animals than in normal ones exposed to the same dose of irritant. This has not been done.

Aside from the applicability of these findings to some smog fatalities, there may also be implications applicable to a certain type of anesthetic death. This relates to patients, generally elderly, who die of pulmonary edema while under an inhalation anesthetic even though a previous examination of heart and lungs indicated the patient to be a reasonably good risk. Inasmuch as the nature of the anesthetic and the technique employed can usually be considered as very similar to that used in other uneventful cases, the cause must reside in the particular make-up of the patient. Inhalation anesthetics, being to some extent pulmonary irritants capable of producing minimal intra-alveolar edema, may thereby cause fatal pulmonary edema in patients with significantly reduced ventilatory reserve. If, in addition to emphysema, there is any considerable pneumoconiosis, the risk of fatal pulmonary edema would appear to be increased.

The partial and even occasional complete demineralization of dust foci in control animals which did not receive ANTU is related to episodes of spontaneous pneumonia in these animals.[7] Another very likely factor is the multiplicity of intratracheal injections employed, each one of which is capable of evoking an inflammatory reaction.

Summary

Sublethal pulmonary edema was produced with α-naphthylthiourea (ANTU) in rats handicapped either by an oleothorax or by pneumoconiosis from quartz or kaolin dust.

Whereas the mortality from the pulmonary edema of ANTU in normal rats was 27%, in the handicapped rats given the same dose of ANTU this mortality was in the neighborhood of 60% regardless of the nature of the handicap.

Microscopic study of the edematous pneumoconiotic lungs reveals significant structural changes in the cells and stroma comprising the dust foci. These changes are associated with a partial demineralization of the dust foci and a wide dispersion of mobilized dust particles throughout much of the intra-alveolar fluid.

These findings plus the predilection of intra-alveolar edema for alveoli about dust foci are interpreted to support our concept that in the presence of significant pneumoconiosis a relatively small amount of pulmonary edema may become an autocatalytic process which may terminate fatally. A similar autocatalysis of pulmonary edema is believed to occur when the pulmonary reserve has suffered considerable reduction. This concept serves as our explanation for some of the fatalities attributed to the inhalation of smog.

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Curriculum in Occupational Medicine for the Medical Student

Report of the Committee on Education and Training, Industrial Medical Association, 1959

IT IS THE function of the scientific committees of the Industrial Medical Association to explore certain areas germane to their core of interest. The Committee on Education and Training has been queried from time to time as to its opinion of the most desirable or needed components of the instruction given the undergraduate medical student in occupational medicine. To formulate a reply of substance, the Committee decided to study the question by means of an opinionnaire to be sent to physicians engaged in full-time or part-time industrial medical practice.

Operating in joint fashion at all points, a schedule was developed, and after considerable review and change, the Committee members assumed responsibility for forwarding the opinionnaires to physicians they selected, in certain assigned groups of states. Eight members sent out 20 schedules each, and through follow-up letters attempted to obtain a maximum response.

Completed opinionnaires were returned by 136, representing a response of 86.0%. Replies were received from 31 states, the greatest number coming from New York (19, or 14.0%) and Ohio was second (15, or 11.0%). The characteristics of the respondents are shown in Tables I through IV.

Although no figures are immediately available for comparison among other physician groups, 18 (13.2%) graduated since World War II, 24 (17.6%) were produced during the war years (1941-1945), and 74 (54.4%) completed their training from 1929 through 1940, years representing the gamut of the depression. The remaining 20 were graduated before 1929. Are these findings indicative of the total cross-section of industrial practitioners, or are they merely characteristic of the sample group? In other words, did industry draw more physicians during the lean years, in spite of retrenchment, or were respondents in this age group by chance alone?

By specialty, 89 (65.4%) of the 136 declared themselves engaged in occupational medicine, or in that area plus one other.

The training varied in duration from one to eight years. Of those with special study, 23 (26.7%) had a one-year residency, 26 (30.2%) completed two years of training, and 14 (16.3%) finished residencies of three years or more, while 23 gave no reply.

Of the 86 with formal post-internship training, 25 (29.1%) had their residencies in internal medicine, 17 (19.8%) were "general," 17 (19.8%) of the group trained in surgery, and 5 (5.8%) of the respondents had completed their specialty education in occupational medicine. Twenty-two did not state their specialty.

Table I—Year Since Graduation from Medical School

Number of Years	Respondents	
	No.	%
6-10	11	8.1
11-15	12	8.8
16-20	31	22.8
21-25	28	20.6
26-30	31	22.8
31-35	11	8.1
36-40	5	3.7
41-44	7	5.1
	136	100.0

Table II—Medical Practice Specialty of Respondents

Specialty	Respondents	
	No.	%
Occupational medicine	75	55.2
General practice	16	11.8
Internal medicine	11	8.1
Surgery	5	3.7
Administrative medicine	4	2.9
Internal medicine and industrial medicine	4	2.9
Occupational medicine and surgery	4	2.9
Occupational psychiatry	3	2.2
Others	8	5.9
Not general practice but specialty not stated	6	4.4
	136	100.0

Committee on Education and Training: J. S. Felton, M.D., Chairman, University of California, Los Angeles, Calif.; R. R. Beard, M.D., Stanford University School of Medicine, Stanford, Calif.; B. Behrend, M.D. Smith, Kline & French Laboratories, Philadelphia, Pa.; B. D. Dinman, M. D., Ohio State University, Columbus, Ohio; J. S. Duffy, M.D., International Business Machines Corporation, New York, N. Y.; D. H. Goldstein, M.D., New York University, New York, N. Y.; H. A. Lewis, M.D., Kaiser Steel Corporation, Fontana, Calif.; L. C. McGee, M.D., Hercules Powder Company, Wilmington, Del.; and J. W. Meigs, M.D., Yale University School of Medicine, New Haven, Conn.

Table III—Residency Training of Respondents

	Respondents	
	No.	%
Had residency training	86	63.2
Had no residency training	50	36.8
	136	100.0

Table IV—Medical School Training of Respondents in Occupational Medicine

	Respondents	
	No.	%
Had undergraduate course in occupational medicine	19	14.0
Had no undergraduate course in occupational medicine	104	76.5
Did not remember or did not state	13	9.5
	136	100.0

Table V—Negative Values of Undergraduate Instruction in Occupational Medicine

Deficiencies in occupational medicine training	Respondents	
	No.	%
Too little material	9	6.7
Insufficient detail	4	3.0
Instructor had no experience or had never been in a plant	4	3.0
No emphasis on precipitation of illness by daily occupational activity	1	0.7
Not associated with clinical medicine	1	0.7
Lack of continuity, excessively technical	1	0.7
No material on occupational health and compensation	1	0.7
Of no help in active practice of industrial medicine	1	0.7
Preventive aspects not stressed	1	0.7
"The professor"	1	0.7
No reply	112	82.4
	136	100.0

The years have brought about change, for in 1954 occupational medicine was included in the undergraduate curriculum in 81% of the medical schools in the United States.* In 1959, of the 19 respondents recalling a course, 10 had the instruction in the fourth year, 8 in the third, and 1 in the sophomore year. When asked what was particularly good about the training that was received, some thought that it served as a good introduction; a few mentioned the enthusiasm and teaching skills of the instructors, or the worth of field study; one mentioned the material descriptive of careers in occupational health; and one thought it noteworthy that there was any instruction included at all.

*Since this report was submitted, data on the teaching of occupational medicine have been updated. In 1960, 89% of the schools of medicine surveyed were offering instruction in this area in comparison with 81% in 1954. See Felton, J. S.: The Teaching of Occupational Medicine in the United States and Canada, *J. of Occup. Med.*, 2:315 (July) 1960.

The group was asked, also, what was not good about the training. The answers varied, as shown in Table V.

Of greatest importance was the response to the question, "In your work as a physician, do you feel that your medical school gave you adequate training in the field of occupational medicine?" The replies are seen in Table VI.

The medical schools from which the respondents graduated included institutions in 28 states, the District of Columbia, and 3 foreign countries. This represents 82.3% of the states in the United States (including the District of Columbia) with schools having four-year programs.

In response to the question, "In your opinion, what year should such training (occupational medicine) be given?" the replies seen in Table VII were offered.

Of the 136 replies, 117 (86.0%) believed that the undergraduate teaching should be given solely in the third and fourth medical school years.

Curriculum Content

The respondents then rated several items within certain categories, in reply to the question: "In your opinion, what is the minimum information regarding occupational medicine and related health subjects which should be obtained by every graduate from . . . medical school, regardless of the character of his future practice?" Numerical values were assigned on a rating scale of 0 to 10 points, where 0 indicated no need, and 10 indicated maximum need for a particular subject in the occupational medical curriculum.

When the topics were rated in the order believed to be of importance to the medical student, the ranking was shown in Table VIII.

Table VI—Adequacy of Undergraduate Training in Occupational Medicine

Adequacy of Training Received	Respondents	
	No.	%
No	115	84.5
Yes	13	9.6
No reply or "No opinion"	8	5.9
	136	100.0

Table VII—Curricular Year for Instruction in Occupational Medicine

Year Training Should Be Given	Respondents	
	No.	%
3rd and 4th years	77	56.6
4th year	33	24.2
3rd year	7	5.2
2nd, 3rd, and 4th years	6	4.4
1st, 2nd, 3rd, and 4th years	3	2.2
Others	3	2.2
No training should be given	5	3.7
No opinion	2	1.5
	136	100.0

Table VIII—Order of Curriculum Topics

Order	Topics	Average Number of Points
1	Dust, fumes, solvents, gases, poisons, detoxication mechanisms, occupational skin disorders	7.84
2	Physical factors affecting workers, including temperature, humidity, ventilation, variations in barometric pressure, illumination, radiant energy, noise and fatigue	7.69
3	Relationships with employee's private physician	7.45
4	Eye injuries, surgical and orthopedic condition, emergency care	7.38
5	Measurement or evaluation of disability	7.15
6	Detection of asymptomatic disease	6.97
7	Counseling	6.79
8	Chronic diseases	6.78
9	Workmen's compensation claims	6.55
10	Prevention of accidents in industry	6.50
11	Acute conditions	6.34
12	Medicolegal relationships in industry	6.12
13	Health education for employees in prevention of disease	6.11
14	Epidemiologic techniques	5.93
15	Health education for employees in mental health	5.90
16	Health Education for employees in physical health	5.75
17	Causes of sickness-absenteeism	5.59
18	Prevention of accidents at home and in school	5.33
19	Health, welfare, and benefit plans in industry	5.13
20	Health education for employees in the use of community agencies	5.06
21	Official health agencies	4.83
22	Voluntary health agencies	4.67
23	Historical background on occupation and health	4.02
24	Structure of industrial organizations	3.45
25	Structure labor organizations	2.79

Highest rating was given to those areas of medical concern which are of greatest pertinence to the in-plant practice of occupational medicine. Likewise, these are topics in which most other practitioners are less sophisticated. A knowledge of the structure of industrial and labor organizations, of occupational medical history, and of health agencies was rated of least worth for inclusion in the curriculum. The respondents were requested, also, to "indicate any other information or subject matter which you believe should be included in the course content." Some of the replies related rather closely to the 25 items rated by the group, but others were sufficiently different to warrant listing. The number of times these topics were suggested coursed from one to five. A grouping of these items resulted in major areas of activity to be considered for inclusion.

Many of these, while contributing considerable weight to the industrial medical load, also impinge themselves upon the philosophy and procedures of practice in other specialties. All of these are germane to the specialty of occupational health, and could be incorporated with some of the basic topics listed, treated individually, or not included as they are more appropriately subjects at the graduate level.

OTHER TOPICS SUGGESTED FOR CURRICULAR INCLUSION WITHOUT POINT RATING

Relationships
- Relationships of physician in industry with members of health team and supervisory personnel
- Union-management relations
- Learning to work with others
- Attitudes *re* services rendered to employees by chiropractors, osteopaths, and other nonallopaths

Behavior
- Psychiatric problems; "malingering"; industrial psychology; emotional health; human relations psychophysiologic reactions; alcoholism; "understanding human nature"
- The total man—his home, transportation problems, recreational activities, group belonging, etc.

Placement and rehabilitation
- Selective placement; the cardiac employee; utilization of the physically handicapped
- Rehabilitation of the seriously injured employee and placement of the partially disabled

Special health and medical problems
- Techniques of resolving problems in industrial hygiene
- Executive health
- Space medicine
- Work physiology
- Compulsory retirement, geriatrics
- Small plants
- Skills in obtaining, and values of, good histories and physical examinations of all types

Documentation
- Medical records, workmen's compensation reports
- Certification of nonoccupational disability
- Biostatistics
- Program evaluation

Industrial Distribution of Respondents

It was desirable that the present activities and problems of the respondents be identified to determine the relationship, if any, between their contemporary areas of difficulty and a suggested curriculum. The numbers of employees and kinds of industry of the organizations for which the physicians had medical responsibility were obtained, and are shown in Table IX.

The distribution of plant size included extremely small organizations, some in the range where full-time physicians might be employed or planned for future inclusion (1,001-2,500), and many large industries with multiple plants.

The type of industry was sought, and the distribution appears in Table X.

Respondents' Practice of Occupational Medicine

The industrial physicians then were given four items considered to be "problems which you face every day and which take up the bulk of your time." These were to be listed in order of importance, and the summary of the ratings is shown in Table XI.

The following is the order of importance of the four items evaluated:

Order	Per cent	Daily Problems of Physicians in Industry
1	40.4	Diagnosis and treatment of injured or ill empoyees
2	31.0	Interpersonal relations
	25.7	Interpersonal relations
3	24.3	Control of preexisting illness
4	36.8	Control of the working environment

These percentage figures represent the position of importance in a scale of one to four ascribed to each of the items by the majority of the respondents. The importance of interpersonal relations in the daily problems faced by the physician in industry is indicated by the fact that a majority of them considered this item as second in importance, following only after diagnosis and treatment of injured or ill employees, and they were almost equally divided between interpersonal relations and control of preexisting illness for the place of third importance.

Table IX—Size of Plants Served by Respondents

Size of Plant by Number of Employees			Respondents No.	Respondents %
1- 25			1	0.7
26- 100			1	0.7
101- 500			4	2.9
501- 1,000			4	2.9
1,001- 2,500			23	16.9
	1,151-1,300	3		
	1,451-1,600	5		
	1,901-2,050	4		
	2,051-2,200	2		
	2,201-2,350	1		
	2,351-2,500	5		
	Multiple plants within 1,001-2,500 range	3		
2,501- 5,000			19	14.0
5,001- 7,500			13	9.6
7,501-10,000			4	2.9
10,001-15,000			9	6.6
15,001-20,000			4	2.9
20,001-and over			31	22.9
Not stated			23	17.0
			136	100.0

Table X—Type of Industry Served by Respondents

Industry	Respondents No.	Respondents %
Agriculture	1	0.7
Mining	3	2.2
Manufacturing*	81	59.6
Transportation and public utilities	16	11.8
Trade, finances, and services	10	7.3
Governments	7	5.2
Not stated	18	13.2
	136	100.0

*Includes chemicals, petroleum, metals (primary and fabrication), machinery, printing, and food processing.

These topics, when compared in rating of importance with the material for the undergraduate curriculum, lined up in this manner:

Subject	Position in List of Four Problems	Position Among 25 Subjects for Ideal Curriculum
Diagnosis and treatment of injured or ill employees	1	4 and 11
Interpersonal relations	2 and 3	7*
Control of preexisting illness	3	6 and 8
Control of the working environment	4	1 and 2

*Item was termed "counseling."

Judged Qualifications for Staff Physician

The physicians were presented with varying backgrounds of education and training for a physician-applicant for a position in occupational health on their staffs, and were asked to state their preferences, in order, of these kinds of preparations for the new physician being added. The responses are shown in Table XII.

Table XI—Daily Problems of Physicians in Industry

Type of Problems	Respondents No.	Respondents %
A. Control of preexisting illness (cardiac, diabetic, arthritic, psychiatric or emotional, etc.)		
Importance rating 1	21	15.4
Importance rating 2	39	28.7
Importance rating 3	33	24.3
Importance rating 4	25	18.4
Not stated	18	13.2
	136	100.0
B. Control of the working environment		
Importance rating 1	16	11.7
Importance rating 2	19	14.0
Importance rating 3	32	23.5
Importance rating 4	50	36.8
Not stated	19	14.0
	136	100.0
C. Interpersonal relations with division heads (as personnel, production, labor relations, safety, etc.)		
Importance rating 1	26	19.1
Importance rating 2	42	31.0
Importance rating 3	35	25.7
Importance rating 4	16	11.7
Not stated	17	12.5
	136	100.0
D. Diagnosis and treatment of injured or ill employees		
Importance rating 1	55	40.4
Importance rating 2	20	14.7
Importance rating 3	20	14.7
Importance rating 4	22	16.2
Not stated	19	14.0
	136	100.0

Table XII—Background and Training Desired for New Full-Time Physician in Occupational Medicine

Type of Training	Respondents No.	Respondents %
A. Formal postgraduate training in occupational medicine		
Importance rating 1	6	4.4
Importance rating 2	37	27.2
Importance rating 3	28	20.6
Importance rating 4	19	14.0
Importance rating 5	11	8.1
Importance rating 6	9	6.6
Importance rating 7	....	....
Not stated	26	19.1
	136	100.0
B. Formal postgraduate training in occupational medicine, plus practical experience in the field		
Importance rating 1	67	49.4
Importance rating 2	20	14.7
Importance rating 3	12	8.8
Importance rating 4	6	4.4
Importance rating 5	5	3.7
Importance rating 6	1	0.7
Importance rating 7	4	2.9
Not stated	21	15.4
	136	100.0
C. Practical experience in the field of occupational medicine alone		
Importance rating 1	4	2.9
Importance rating 2	25	18.4
Importance rating 3	44	32.3
Importance rating 4	22	16.2
Importance rating 5	13	9.6
Importance rating 6	6	4.4
Importance rating 7	....	....
Not stated	22	16.2
	136	100.0
D. Training in surgery and surgical experience		
Importance rating 1	5	3.7
Importance rating 2	9	6.6
Importance rating 3	5	3.7
Importance rating 4	8	5.9
Importance rating 5	16	11.7
Importance rating 6	50	36.8
Importance rating 7	9	6.6
Not stated	34	25.0
	136	100.0
E. Training in medicine and medical experience		
Importance rating 1	21	15.4
Importance rating 2	13	9.6
Importance rating 3	16	11.8
Importance rating 4	21	15.4
Importance rating 5	27	19.8
Importance rating 6	7	5.2
Importance rating 7	2	1.5
Not stated	29	21.3
	136	100.0
F. General Practice Background		
Importance rating 1	17	12.5
Importance rating 2	9	6.6
Importance rating 3	9	6.6
Importance rating 4	34	25.0
Importance rating 5	24	17.6
Importance rating 6	13	9.6
Importance rating 7	1	0.7
Not stated	29	21.4
	136	100.0
G. No special training or background		
Importance rating 1	5	3.7
Importance rating 2	1	0.7
Importance rating 3	1	0.7
Importance rating 4	....	....
Importance rating 5	3	2.2
Importance rating 6	12	8.9
Importance rating 7	69	50.7
Not stated	45	33.1
	136	100.0

Descending order of importance of these background items in serving industry full time was this:

Order	Per cent	Background Desired for New Full-time Physician
1	49.4	Formal postgraduate training in occupational medicine plus practical experience in the field
2	27.2	Formal postgraduate training in occupational medicine
3	32.3	Practical experience in the field of occupational medicine alone
4	25.0	General practice background
5	19.8	Training in medicine and medical experience
6	36.8	Training in surgery and surgical experience
7	50.7	No special training or background

Occupying the top two positions of choice were backgrounds involving formal training. Only 22 of the 91 expressing opinions on Item G felt that the staff physician candidate should come to his job without special training or background—as shown by ratings other than that of 7, the last rank. It is apparent from the above that the respondents were quite decided regarding the first and last items of choice, with a more equitable distribution among the remaining five items, i.e., B through F.

The request was then made to the physicans that they rate the background items for a new part-time physician to be added to their staffs, and their ratings of the same seven items are seen in Table XIII.

Table XIII—Background and Training Desired for New Part-Time Physician in Occupational Medicine

Type of Training	Respondents No.	Respondents %
A. Formal postgraduate training in occupational medicine		
Importance rating 1	3	2.2
Importance rating 2	24	17.6
Importance rating 3	19	14.0
Importance rating 4	16	11.8
Importance rating 5	13	9.5
Importance rating 6	22	16.2
Importance rating 7	2	1.5
Not stated	37	27.2
	136	100.0

(Table XIII—Continued)

Type of Training	Respondents No.	Respondents %
B. Formal postgraduate training in occupational medicine plus practical experience in the field		
Importance rating 1	39	28.7
Importance rating 2	10	7.3
Importance rating 3	10	7.3
Importance rating 4	19	14.0
Importance rating 5	16	11.8
Importance rating 6	2	1.5
Importance rating 7	2	1.5
Not stated	38	27.9
	136	100.0
C. Practical experience in the field of occupational medicine alone		
Importance rating 1	11	8.1
Importance rating 2	24	17.6
Importance rating 3	30	22.1
Importance rating 4	18	13.2
Importance rating 5	13	9.6
Importance rating 6	4	2.9
Importance rating 7	....	....
Not stated	36	26.5
	136	100.0
D. Training in surgery and surgical experience		
Importance rating 1	5	3.7
Importance rating 2	14	10.3
Importance rating 3	12	8.8
Importance rating 4	14	10.3
Importance rating 5	15	11.8
Importance rating 6	26	19.1
Importance rating 7	8	5.9
Not stated	42	30.9
	136	100.0
E. Training in medicine and medical experience		
Importance rating 1	27	19.9
Importance rating 2	15	11.0
Importance rating 3	14	10.3
Importance rating 4	12	8.8
Importance rating 5	21	15.4
Importance rating 6	8	5.9
Importance rating 7	3	2.2
Not stated	36	26.5
	136	100.0
F. General Practice Background		
Importance rating 1	20	14.7
Importance rating 2	20	14.7
Importance rating 3	18	13.2
Importance rating 4	18	13.2
Importance rating 5	11	8.1
Importance rating 6	13	9.6
Importance rating 7	....	....
Not stated	36	26.5
	136	100.0
G. No special training or background		
Importance rating 1	4	2.9
Importance rating 2	1	0.7
Importance rating 3	....	....
Importance rating 4	2	1.5
Importance rating 5	4	2.9
Importance rating 6	13	9.6
Importance rating 7	59	43.4
Not stated	53	39.0
	136	100.0

Descending ratings, as provided for the part-time physician in occupational medicine, are these:

Order	Per cent	Background Desired for New Part-time Physician
1	28.7	Formal postgraduate training in occupational medicine, plus practical experience in the field
	17.6	Formal postgraduate training in occupational medicine
2	17.6	Practical experience in the field of occupational medicine alone
3	22.1	Practical experience in the field of occupational medicine alone
4	14.0	Formal postgraduate training in occupational medicine, plus practical experience in the field
5	15.4	Training in medicine and medical experience
6	19.1	Training in surgery and surgical experience
7	43.4	No special training or background

It is apparent from the above rating that Item F, General Practice Background, does not appear. As the percentages of choice of this item at rating levels 1, 2, 3, and 4 were approximately the same, there is not sufficient difference to place this in a significant position in the rating table. Presumably the feeling regarding the general practice background was not sufficiently strong to place this in the final running. Formal training, even for the physician to serve industry on a part-time basis, was considered of great importance, for this item was placed at the first and second (shared) ranking levels.

There was agreement, once more, that the absence of training warranted last consideration, and the item, Training in Surgery and Surgical Experience, again was placed in the penultimate position.

Chief Activities of Respondents' Medical Departments

Of the physicians completing the opinionnaires, 111 offered information regarding the activities of their departments and 25 refrained. As several listed more than one item for each of their chief activities, multiple coding resulted.

ACTIVITIES OF MEDICAL DEPARTMENTS

Activities of First Importance	
Physical examinations and placement	49
Emergency medical care for occupational and nonoccupational illnesses and injuries	33
Industrial hygiene-hazard control	9
Counseling (mental health)	8
Disease prevention	6
Administration	3
Miscellaneous	4
Activities of Second Importance	
Physical examinations and placement	43
Emergency medical care for occupational and nonoccupational illnesses and injuries	17
Industrial hygiene-hazard control	12
Counseling (mental health)	9
Disease prevention and disability surveillance	9

Administration	7
Absenteeism study and control	6
Public relations	4
Joint consultation with managerial personnel	3
Miscellaneous	4
Activities of Third Importance	
Physical examinations and placement	21
Emergency medical care for occupational and nonoccupational illnesses and injuries	20
Industrial hygiene-hazard control	17
Counseling (mental health)	13
Absenteeism study and control	8
Health education	8
Accident prevention	5
Administration	4
Disease prevention and disability surveillance	3
Joint consultation with managerial personnel	3
Immunization programs	2
Miscellaneous	6

In each of the three areas of activities delineated, physical examinations, emergency medical care, and industrial hygiene were the leading departmental undertakings. Interesting items noted were, "problem children," "abuse of the hospitalization plan," and "examination of the public on public transportation."

Unsolved Problems

The last question in the opinionnaire was, "What three activities would you consider your major unsolved problems in the conduct of your occupational health program?" Although the same number of lines was provided for the reply, there was, presumably, enough of an invitation to bring forth a freshet of feelings. The problems were numerous and far exceeded the physicians' on-going activities. Because of the interest of many of these problems, all will be listed, although in many instances, the problem was stated by only one respondent.

Unresolved Problems

1. *Procedures in medical and industrial hygiene practice*	
Disease prevention	13
Organization and execution of an industrial hygiene service	12
Nonoccupational injuries and disability	6
Disability evaluation	3
Increasing the number of periodic physical examinations to the level of adequacy	3
Aging workers and degenerative disease	2
Noise	2
Better measuring devices for early diagnosis	
Better psychologic evaluation at pre-placement level	
Control of preexisting illness	
Dermatologic control	
Executive health program	
Extending program to widely spread population groups	
Extending program to workers' homes	
Inadequate understanding of industrial physician regarding accurate estimates in workmen's compensation problems	
Insufficient program	
Lack of physical inventory of those in hazardous jobs	
Low back syndrome	
Preretirement counseling	
Rehabilitation facilities	
Rehabilitation of the mentally ill	
Reorganization of multiphasic screening procedures	
2. *Relationships*	
Relationship between union and managers and between union and medical department*	7
Rehabilitation of injured employees in relation to union seniority system	5
Interdepartmental relations	3
Adequate medical care for low-paid industrial workers (extramural care)	
Aggressive safety department	
Better methods for joint personnel-medical studies	
Broken or late appointments	
Inadequate time for public relations	
Medicolegal problems	
3. *Status*	
Placement of the medical department in the organization—prestige factor	
Status of occupational medicine in eyes of colleagues	
Status of occupational medicine in eyes of individual workers	
4. *Motivation and communication*	
Health education	15
Education of the outside physician in:	14
a. Cooperation	
b. Knowledge of occupational health programs	
c. Difference between occupational and nonoccupational disorders	
d. Excessive authorized sick leave for his patients	
e. Providing proper diagnosis	
Employment and placement of the disabled	10
Communication with management	3
Managerial cooperation in preventive medical program	3
Education of the worker regarding "It happened at work"	2
Motivating professional interest in the part-time physician, and obtaining competent performance	2
Teaching managerial personnel to use the medical service	2
Teaching union personnel to use the medical service	2
Cost control of fringe benefits for occupational and nonoccupational illness	
Motivating managers on worth of physical examinations	
Motivating employees to realize importance of health	
Physicians and nurses showing interest in employee-patients	
Relationship of occupation to cause or aggravation of such conditions as heart disease, emphysema, etc.	
Suspicion that a management-fostered action is against the welfare of the workers unless conceived by the union	
5. *Administration*	
Budget	3
Administration and staff problems	2
Obtaining adequately trained physicians and nurses for salaries offered	2

*This was picturesquely phrased by one as "labor and medicine co-existence."

Reporting to "laymen" in the personnel department rather than to top managers 2
Accomplishment of objectives for preplacement physical examination with time and budget allowed part-time physician
Coordination of total medical services
Extension of best and uniform medical service to all employees
Follow-up of abnormal findings on physical examination
Prevention of peaks and valleys in patient load
Shortened work week and work day—tardiness, smoking, and coffee breaks by medical personnel

6. *Behavior*

Emotional disorders, counseling, mental health program 17
Absenteeism 16
Alcoholism 8
Accident prevention 7
Emotional factors in occupational injury 2
Workmen's compensation laws and "compensationitis" 2
Evaluation of motivation
Foremen's understanding of human relations
Measurement of stress

7. *Evaluation and planning*

Evaluation of one's program 6
Obtaining of accurate epidemiologic data in relation to environment, with reasonable effort and a good record system 3
Standard of occupational health measures

Not to be omitted from the list is the pointed problem stated by one physician: "Shots for old men."

The Ideal Curriculum

Accepting the content of the responses as indicative of the structure to be given the undergraduate curriculum, the various items ranked and activities and problems listed should be scanned for similarity. All of the topics considered, whether as curricular items, daily problems of the industrial physician, his activities, or his unresolved problems, can be classified under several major groupings:

Occupational health hazards
- Recognition
- Measurement
- Evaluation
- Control

Chronic disease states
- Detection
- Measurement
- Evaluation
- Disposition

Acute conditions
- Emergency care
- Referral
- Workmen's Compensation Insurance

Problems in behavior
- Recognition
- Counseling
- Referral
- Supervisory training
- Prevention and Control

Intraplant and Extraplant relationships
- Communication
- Motivation
- Education

Administration and documentation
- Records
- Epidemiology

It is of interest that, irrespective of the method of questioning, the replies seemed to focus on these six main areas. The order of preference probably parallels the respondent's perception of the activity as an easily accomplished facet of his program, or as a problem which implies difficulty in completing. Further, the priority ratings easily can represent the skills or absence of skills in specific segments of the medical program manifested by the respondents.

Significant, though, is the observation that in regard to the six centers of professional action, little is offered in the medical school curriculum to provide a beginning level skill. Assuming that occupational medicine is not offered to the undergraduate, where will he be familiarized with the activities which he will be called upon to execute as a part-time or full-time medical consultant to industry? Let us look at these six fields in this light.

1. Occupational health hazards
   These are discussed rarely, but an occasional patient with "poisoning" will be presented in medicine.
2. Chronic disease states
   Patients with these conditions almost never are admitted to hospital services, for they are not "interesting teaching cases." If there is a discussion of these states, it will take place in preventive medicine.
3. Acute conditions
   More than any of the six, recognition and treatment of these conditions will be offered in surgery, orthopedics, and emergency surgery, but rarely in medicine is treatment of the minor clinical conditions reviewed, e.g., dysmenorrhea, headache, diarrhea, respiratory infections, and food poisoning.
4. Problems in behavior
   If the school is somewhat progressive, teaching of the behavioral sciences will be carried out in the first year, but problems of groups, or specific examples of symptomatic behavior, such as withdrawal from work (absenteeism), will remain uncovered.
5. Intraplant and extraplant relationships
   These are almost never alluded to in the undergraduate curriculum.
6. Administration and documentation
   Apart from exercises in recording the patient's history and physical examination, no specific teaching is provided.

Conclusions

In the light of this, therefore, it seems logical that a curriculum in occupational medicine be offered, and that these specific topics be included in it as a survey course, with elaboration or emphasis on one or the other as the instructor feels necessary.

The Committee interprets, therefore, the consensus of the respondents in this manner:

1. Occupational medicine should be taught in the third and fourth undergraduate years of the medical school curriculum.

2. The curricular content should provide a survey of these topics:

a. Occupational Health Hazards
   (1) Classification
   (2) Methods of identification
   (3) Methods of measurement
   (4) Methods of evaluation
   (5) Clinical measurement
   (6) Medical control
   (7) Industrial hygiene engineering control
   (8) Other methods of control

b. Chronic Disease States
   (1) Detection through the preplacement physical examination, the periodic physical examination, the examination of executives, the aging employees, and the pre-retirees
   (2) Methods of clinical measurement utilizing case-finding survey techniques
   (3) Selective placement of new and long-service employees, with evidence of chronic disease changes
   (4) Disability evaluation
   (5) Rehabilitation of disabled patients
   (6) Referral and follow-up methods, including industrial medical department and private physician

c. Acute Conditions
   (1) Principles of emergency medical and surgical care for acute nonoccupational conditions
   (2) Principles of treatment of acute occupational illnesses, and injuries
   (3) Systems of referral and preparation of patient for referral
   (4) Principles of workmen's compensation insurance legislation and practice

d. Problems in Behavior
   (1) Stress at the work site, and its effects upon the worker
   (2) Forms of symptomatic behavior seen at work: absenteeism, accident repetition, impaired production, elevated incidences of dispensary visits, psychophysiologic reaction and labor turnover
   (3) Principles of counseling
   (4) Methods of referral and preparation of the employee-patient for referral
   (5) Detection and prevention of acute stress reactions

e. Intraplant and Extraplant Relationships
   (1) Functions relating to motivation of personnel toward improved health behavior
   (2) Relationships with physicians extramural to plant
   (3) Communication of health information to plant workers

f. Administration and Documentation
   (1) Organizational structure of in-plant medical service
   (2) Agencies concerned with occupational health
   (3) Significance and needs of good clinical records
   (4) Use of records for epidemiologic review

Summary

The Committee on Education and Training of the Industrial Medical Association designed and forwarded an opinionnaire to 160 physicians engaged in one form or another of occupational medical practice. Completed opinionnaires were received from 136, or 86%. Responses came from 82% of the states having four-year medical school programs.

Some of the respondents participating in the completion of the opinionnaires had graduated as recently as six years ago from medical school, and others as remotely as 44 years ago; 63% of the respondents had residency training, and only 14% had any undergraduate training in occupational medicine.

The respondents had medical responsibility for industrial installations ranging in size from 20 to more than 20,000 employees. Approximately 50% of the respondents served plants of more than 10,000 employees, and 60% of them were engaged in one or another form of manufacturing industry.

For the majority of the respondents, leading medical departmental activities were physical examinations, emergency medical care, and industrial hygiene.

When asked to rank daily problems which involved the greater part of their time, the respondents placed the diagnosis and treatment of injured and ill employees in the first position, interpersonal relations in second place, and control of pre-existing illness and control of the working environment following this.

The unsolved problems listed by the respondents relating to their occupational medical practice concerned seven areas: procedures in medical and industrial hygiene practice; relationships; status; motivation and communication; administration; behavior problems; and evaluation planning.

Of the respondents, 81% believed that the undergraduate training in occupational medicine should take place in the third and fourth years.

The respondents ranked 25 items for inclusion in the undergraduate curriculum, according to need, and the following items placed high on the scale: occupational health hazards; hazardous factors in the physical work environment; relationships with the employee's private physician; emergency medical care; and measurement of disability. Additional topics suggested for inclusion in the curriculum were: relationsips; behavior problems; placement and rehabilitation; special health and medical problems; and documentation.

Formal postgraduate training in occupational medicine, either alone or plus practical experience in the field, was considered the most important background for physicians serving industry, on either a full-time or a part-time basis.

Editorial

Haven't We Been Here Before?

THE OBSERVER of human behavior can't help being impressed with the phenomenon of recurrence. The developers of fads, practices, and foibles periodically run dry of variations, and offer as a next "new" step the discarded custom of another day.

The incoming president of a large corporation, faced with the necessity to do something because of generalized, administrative ailment, is apt to bring a sprawling collection of autonomous units into a tight, monolithic, highly centralized structure. Or, if the firm should happen to be highly centralized at the time a change is needed, the new chief with equal alacrity will enforce dispersal into autonomous units. In this case, the choices of major change are only two, and the responsible officer chooses that which is currently available. Apparently movement, not direction, is important here. Those of us connected with industry may expect to see this pendulum of reorganization swing back and forth as the years roll on.

The automobile moved from a small, noisy, manually controlled job to a virtually automatic giant and back to a small, noisy, manually controlled job in about half a century. True, the early version was called a roadster or a runabout and the later one a sports car, but the noise and physical discomfort associated with the ride remain, as does the need for constant mechanical tinkering. The Empress Eugenie hat, complete with tilt and ostrich feathers, made its reappearance in the 1930's, about 70 years after its introduction. Those still around here in the spring of the year 2,000 will certainley see this bonnet designed once more as a Paris original. And there undoubtedly will be a day, centuries after atomic fission has been used as man's exclusive source of controlled energy, when clever engineers will rediscover the usefulness of coal and petroleum as commercial fuels.

Comes now a recurrence of a type of management behavior so recently abandoned as to seem never to have left the stage. A case is made for toughness and forthrightness as instruments for forging profitable business organizations.* It turns out that the goal of an enterprise may not be the creation of a glowing togetherness, after all. Rough, unpalatable ideas like productivity and effectiveness, with or without happiness, are in a fair way of becoming dominant themes again in the years immediately ahead. The recently issued Special Report of *Industrial Relations News* which discusses these matters is based largely upon an address by Prof. Chris Argyris, the Department of Industrial Administration, of Yale University, and upon a study reported from the University of Michigan Institute of Social Research. The industrial physician will have no direct responsibility in any of this, but it is essential that he become aware of these predicted changes in the work environment.

The report develops three ideas. First, it labels as "kid glove thinking" the belief that success will come to the business enterprise only when all employees like each other and are happy at work. The next point made is that effective communication is not synonymous with maximum communication; believability is earned when behavior matches statement, whereas pipelines glutted with trivial information generate annoyance and disdain. Finally, disjointed management behavior which displays good fellowship and the old college spirit, on one hand, and, on the other, flaunts private dining rooms, toilets, and parking lots engenders employee cynicism. The desired respect for authority has to be earned by strong leadership, tough administration, and fair treatment. The frills won't work any longer.

The goal of a highly motivated work force willing to perform at full capacity in the interest of the company's objectives allegedly can be achieved through the application of principles of interpersonal behavior now being rediscovered for the umpteenth time. We've been down this road before. This time there is a certain urgency about our course, resulting from the pressures of competition from countries where discipline is tougher than we have wished our own to be. We will probably succeed in making the change, albeit with some creaking under the strain.

*The "Hard" Approach to Human Relations, *Industrial Relations News*, Special Report, Feb. 1961.

Book Reviews

TOXIC ALIPHATIC FLUORINE COMPOUNDS. F. L. M. Pattison, M.A., Ph.D. Price, $3.50. Pp. 227. D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N.J., 1959.

By DAVID W. FASSETT, M.D.

Possibly one of the most significant recent developments in the field of toxicology has been the discovery of the toxic properties and mode of action of fluoroacetic acid. Pattison's monograph, the second in a series on Industrial Toxic Agents, provides a fascinating and comprehensive account of this subject.

The importance of fluoroacetic acid is twofold. First, it is now known to be a highly effective rodenticide and mammalian pest-control agent and has been discovered to be the toxic constituent of the extremely poisonous South African plant known as "gifblaar." Second, and more important, is the fact that the discovery of its mechanism of action has been accompanied by fruitful investigations of many related compounds, such as aliphatic alcohols, acids, esters, aldehydes, and ethers. Fluoroacetic acid is converted in vivo to fluorocitric acid, which, in turn, almost completely blocks the tricarboxylic acid cycle essential to the metabolism of nearly all cells. There is a characteristic accumulation of citric acid in animals poisoned by fluoroacetic acid. As a result of the study of many hundreds of aliphatic compounds substituted with fluorine in the omega position, it was apparent that any compound which can form fluoroacetic acid by either hydrolysis or oxidation possesses a high degree of toxicity, whereas compounds which are not metabolized in this manner are relatively free of toxicity. In this manner, confirmation for many of the current theories of the metabolism of aliphatic compounds could be obtained.

In addition to a comprehensive historical discussion of the discovery of the action of fluoroacetic acid and a description of its action, the monograph includes many valuable tables which point out the pertinent facts regarding the correlation of chemical configuration and physiological activity. The correlation of such data with current theories regarding the metabolism of the various classes of compounds is of particular interest. The reader should, however, be cautious in interpreting the screening data given in the tables which are based on intraperitoneal injections in mice. The term "nontoxic" or "indefinite" may mean, for example, an LD_{50} varying from 40 mg/kg to perhaps somewhat greater than 100 mg kg which for the purposes of the industrial hygienist or toxicologist might not be considered exactly harmless. In other words, the toxicity data in this should be thought of in relative terms. It is perfectly valid for the purposes for which Pattison uses it.

The discussion of the medical aspects of fluoroacetate type of poisoning is accurate and contains up-to-date advice on antidotes, even though the latter are not very effective. There is a brief discussion of other fluorine-containing compounds such as polymers and fluorine-containing anesthetics. Of interest to the organic chemist is the brief section on methods of preparation of aliphatic fluorine compounds. A number of other monographs on industrially important toxic agents are said to be in preparation, and their appearance will be awaited with interest by all toxicologists.

Dr. Fassett is Director, Laboratory of Industrial Medicine, Eastman Kodak Company. He is responsible for the experimental toxicological investigations supported by that firm.

THE EFFECT OF EXPOSURE TO THE ATOMIC BOMBS ON PREGNANCY TERMINATION IN HIROSHIMA AND NAGASAKI. J. V. Neel and W. J. Schull. Price, not given. Pp. 241, with illustrations, graphs, and tables. National Academy of Sciences—National Research Council, Washington 25, D. C., 1956.

By W. DAGGETT NORWOOD, M.D.

Genetic hazard of radiation is a major factor in determining maximum permissible exposures or radiation guides. Hence, the genetic effect of the exposure of human populations at Hiroshima and Nagasaki becomes tremendously important. The Atomic Bomb Casualty Commission has reported on over-all effects, and this study is one facet of a comprehensive study to obtain and analyze detailed information concerning the various possible late or delayed biological effects of exposure to an atomic bombing.

This monograph is a report of a detailed study covering the period 1946-1955 to determine (1) whether there are differences between the children born to parents one or both of whom were exposed to the effects of the atomic bombings of Hiroshima and Nagasaki and the children born of suitable control parents, and (2) if differences do exist, how are these to be interpreted?

By considering symptoms, shielding, and distance of the persons from the hypocenters, an approximation is made of the father's and the mother's radiation exposure. Subjects are then placed in five categories depending upon the degree of exposure. The exposure range is from Category 1, subjects who were out of the cities at the time of bombing and have received no radiation (ignoring residual radiation), to Category 5, subjects who were symptomatic and within 3,000 m of the hypocenter. Category 5 subjects are considered to have received as a minimum the equivalent of 200 R of gamma rays with a maximum dose in the neighborhood of the equivalent of 600 R of gamma rays.

Dr. Norwood is Chairman of the Radiation Committee, Industrial Medical Association, and received the latter's Meritorious Service Award in 1960 for his work. He is the author of several original articles in his field.

Statistical methods are used to minimize as far as possible the effect of different factors in the subgroups, other than radiation, which might influence all the indicators of possible genetic damage. These factors are consanguinity, age and parity, economic status, frequency of induced abortions and of dilatation and curettage of the uterus, frequency of repeat registrations, parental cooperation, late sequelae of exposure to the bombs, the changing proportion of control and irradiated from year to year, and the background of group 1 subjects.

The indicators of radiation damage of a genetic type which were selected were (1) sex ratio, (2) birthweights, (3) measurements of bodily development, (4) frequency of stillbirths, (5) neonatal deaths (within first six days) and also measurements during first nine months, and (6) gross malformations.

No statistically significant difference was found in these indicators for infants born of parents highly exposed to radiation as compared with the control group in which the exposure was negligibly small. This was to be expected from the available information concerning genetic effects of radiation in fruit flies and mice.

This collection and correlation of the relationship between irradiation and the outcome of 76,626 pregnancies is a monumental piece of work which adds materially to our knowledge in this field.

The information should be of tremendous value in dealing with claims of adverse affects upon offspring of parents having varying exposure to radiation.

The monograph should be of interest to all physicians and workers in the field of radiation protection who are faced with the problem of genetic consequence of radiation. It should also serve as an excellent model for those desiring to make similar studies on groups in the atomic energy industry or in other pursuits where there may be intermittent chronic exposure to groups exceeding that for the general population.

HARMFUL EFFECTS OF IONISING RADIATIONS. Edited by Ethel Browning, M.D. Price, $3.00. Pp. 158. D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N.J., 1959. Elsevier Monograph.

By THOMAS S. ELY, M.D.

Here, in readable form, is a creditable work of modest size on the subject of radiobiology and radiation protection. It could be completed at a sitting. Chapters on units of radiation, protective measures, industrial applications of ionizing radiation, and biological hazards will be of interest to those with responsibility in the fields. The "effects" chapters are broad in scope and contain good terminal reference lists.

Condensing efforts have lead to some misleading statements and a few simple errors. The book is basically sound, nevertheless, and will be useful as an interesting primer on the subject.

Dr. Ely originated the abstracts on Radiation Health in this Journal and now heads the group of abstracters who carry on this work.

Publications Available

The following list of publications has been compiled on the basis of probable interest to the readers of this Journal and is presented solely for the purpose of giving notice of their availability.

The Health of California Workers. Price, not given. Pp. 72, with contents page, 16 tables, and a summary. Available from State of California Department of Public Health, 2151 Berkeley Way, Berkeley 4, Calif.

The California Health Survey, conducted between May, 1954, and May, 1955, was the first statewide effort to measure illness, disability, and use of medical services. The survey was based on interviews of a representative sample of 10,000 households throughout the state and covered 30,000 persons, of whom 12,000 were classified as workers. The present report presents findings among the latter. It compares disability rates among workers with those of the general population. Within the work force itself correlations are presented between such variables as sex, socio-economic class, and insurance coverage, on the one hand, and disability rates, hospital use, accidents, and chronic disease rates, on the other.

Positive Health of Older People. Price, $2.25. Pp. 131, paperback, indexed. For sale by the National Health Council, 1790 Broadway, New York 19, N. Y.

Brought together in this one volume are statements by physicians, educators, sociologists, economists, biological and medical researchers, clergymen, experts in housing, insurance and personnel administration; pyschiatrists, nurses, dentists, social workers, dietitians; officials in public health and welfare; heads of hospitals, clinics, nursing homes, and other institutions; and leaders in business, labor, and voluntary organizations who participated in the 1960 Health Forum. Among the subjects discussed are the changing attitudes toward aging; investigation and discovery in physical aging, in mental and emotional health, and rehabilitation; new approaches to health services; retirement planning; institutional services; trends in cultural and family patterns; housing; community activities; and goals for the future.

Special Study on the Medical Care Program for Steelworkers and their Families. A Report by the Insurance, Pension and Unemployment Benefits Department, United Steel Workers of America, Tenth Constitutional Convention, Atlantic City, N.J., September, 1960. Paperbound brochure. Price, not given. Pp. 114 (profusely illustrated), including Foreword, Table of Contents, and an Appendix of Nine Tables. Copies available from the United Steelworkers of America, Public Relations Department, 1500 Commonwealth Building, Pittsburgh 22, Pa.

The union's present medical care insurance pro-

grams are summarized, analyzed, and compared with collectively bargained programs of other unions. The USWA's goals for its members are said to include fully prepaid, comprehensive health care for union members and their families. Efforts to achieve this will be along two lines: modifications in the present arrangements with standard insurance carriers, and pilot projects of prepaid services by medical practice groups in selected steel manufacturing areas.

Questions

The questions published in this column are edited versions of requests for information that have been received during recent months. The answers have been prepared by one or more competent authorities in the particular area covered by the question. Readers may address questions to the Editor.

QUESTION: *What are the hazards associated with the mining and milling of uranium ores?*

ANSWER: Mining and milling of uranium ores are subject to the usual health and safety hazards of any hard rock mining operations. Principal among the health hazards is that of silicosis. Control of this hazard is accomplished by the use of wet methods and ventilation, as in other mines.

In some of the uranium mines diesel-powered engines are used underground. Again, this is not peculiar to uranium mines. The fumes from the diesel engine exhaust offer some health hazards. The U. S. Bureau of Mines recommends 100 to 200 cubic feet of fresh air supplied per brake horsepower of diesels used. In passing, we may comment that such a ventilation rate will at the same time accomplish control of possible radon exposures.

The primary hazard peculiar to uranium mining is the exposure to radon and its daughter products. Public Health Service Publication No. 494, "Control of Radon and Daughters in Uranium Mines and Calculations on Biologic Effects" presents this problem in considerable detail.

The matter of airborne dusts of radium and uranium does not present a significant problem in the mining operations if adequate controls of silica dust are employed. In some of the milling and transporting operations dusts of uranium and radium may become significant. In such instances radium is almost always the more important because of a 30-fold relationship between the equilibrium concentrations of uranium and radium and their respective threshold limit values. In studies made by the Public Health Service only about 10% of the air samples exceeded the threshold limit for radium, and a much smaller proportion exceeded the limits for uranium dust in the air. Standard methods of dust control appear to be adequate in most cases, although there may be some hazard in the handling of concentrates.

There is a potential hazard from exposure to gamma radiation in the mining and milling of uranium ores. This varies so greatly from mine to mine and mill to mill that is must be evaluated individually in each operation. The most likelihood of excessive exposures occurs in the vicinity of stock-piled ore or concentrate. Conceivably, the handling of high grade ore could also produce significant gamma ray exposures.

The inspection and safety requirements vary greatly among the different States. All states in which uranium mining is presently in operation have some laws governing mining in general. There is a great deal of difference from state to state in these general laws. There is even greater variation in the radiological health inspection and control. The U. S. Bureau of Mines has jurisdiction of uranium mines operated on federal public lands.

From the Readers

EDITOR'S NOTE: Occasionally strong difference of opinion may arise from the answers published in this section; there may also be an inadvertent omission of pertinent references due to the fact either that the consultant is unaware of the reference or that it is published after the answer has been developed and received for publication. For example, the answer to a question regarding the toxicity of metallic carbonyls which appeared in the February, 1961, issue of this JOURNAL inadvertently omitted reference to any publications regarding the toxicity of cobalt hydrocarbonyl. In the *American Industrial Hygiene Association Journal*, (20:453 [Dec.] 1959), a study by Edward D. Palmes, Norton Nelson, Sidney Laskin, and Marvin Kuschner pointed out that the toxicity of cobalt hydrocarbonyl is approximately half that of nickel carbonyl. One of the problems experienced by these investigators was the rapid decomposition of the cobalt hydrocarbonyl.

If any readers find that they have comments about the answers published in this section or would like to make additions, they are invited to correspond with the JOURNAL, and whenever possible, their comments will be published in this column. . . .

TO THE EDITOR: In the feature, "Questions," in your March, 1961, issue a discussion of the surgical removal of foreign bodies states "If the glass contains sufficient lead, it may be possible to visualize the particle on roentgenograms."

This "old wives' tale" dies hard. Find enclosed a reprint of an article by this writer on the "Radiographic Characteristics of Glass," *A.M.A. Archives of Industrial Health*, (18:470-472 [Dec.] 1958), which demonstrates that most common types of glass, such as window glass, bottle glass, Pyrex glass, and electric light bulbs, do not contain lead. A fragment of 0.1 mm thickness of these glasses can be seen in the soft tissues. The radiographic density of common glasses depends not on their lead content but on their density or specific gravity.

—W. C. ROBERTS, M.D., Medical Supervisor,
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Niagara Works, Niagara Falls, N.Y.

Abstracts of Current Literature

Noise and Hearing

Monaural Temporary Threshold Shift Following Monaural and Binaural Exposures. I. J. Hirsh.* J. Acoust. Soc. America 30: (Oct.) 1958. (*Central Institute for the Deaf, St. Louis, Mo.)

In the first series of measurements, the monaural temporary threshold sift (TTS) was measured for 1000 cps after a one-minute exposure to a continuous pure tone of the same frequency at 20, 80, and 100 db sensation level. In a second series, the threshold shift was measured at 1400 cps after a one-minute exposure to 1000 cps at 100 db sensation level. In the third series of measurements, the threshold shift was measured at 4000 cps following a three-minute exposure to 110 db of white noise. The threshold measurements for TTS were always monaural, while the exposures were either monaural or binaural.

Results indicate that the TTS for 1000 cps is the same whether the tested ear alone or both ears simultaneously are exposed to a 1000 cps tone at 20, 80, or 100 db sensation level. Monaural TTS for 1400 cps after monaural and binaural exposure for one minute to 1000 cps at 100 db shows no difference in the initial part of the recovery curve, but the diphasic recovery curve or "bounce" is clear only after monaural exposure, not after binaural. Monaural TTS for 4000 cps after monaural and binaural exposure for three minutes to white noise at 110 db indicates little or no difference. The authors conclude that one would be justified in comparing results of laboratory studies and field studies that have used similar conditions even though only one ear was exposed in a laboratory study, while both ears were exposed in a typical field study. —R.G.H.

The Effect of Stimulus Intensity on the Pattern of Recovery from Auditory Fatigue. J. F. Jerger.* School of Aviation Med. Rep. 55-143 (Jan.) 1956. (*Audiology Laboratory, Northwestern University, Evanston, Ill.)

The effect of stimulus intensity on the pattern of recovery from auditory fatigue was investigated by plotting the recovery curves for a train of 4000 cps short tones after 80, 85, 90, 95, 100, 105, or 110 db stimulation at 3000 cps. Eight practiced subjects were tested in seven experimental sessions. The fatiguing tone was on for a two-minute period at each session. The auditory threshold recovery pattern after intense stimulation is characterized by a secondary maximum, or "bounce," at approximately two minutes following cessation of the fatiguing stimulus. The mean recovery curve showed a gradual increase in the "bounce" magnitude with a gradual rise in threshold shift as the fatiguing tone was increased from 80 to 95 db. For levels above 95 db, a sudden acceleration in the initial threshold was accompanied by a gradual decrease in the magnitude of the bounce, and at 110 db the bounce had completely disappeared from the recovery curve. It is suggested that the disappearance of the bounce from the recovery curve may work the transition from fatigue, per se, to reversible acoustic trauma. —R.G.H.

Relationship of Auditory Fatigue to Permanent Traumatic Hearing Loss. G. C. Oppliger,* G. von Schulthess, and G. Grandjean. Acta oto-laryng. 52:415 (Nov.-Dec.) 1960. (*HNO-Klinik der Universität Zurich, Switzerland.)

A group of 33 metalsmith apprentices were given regular audiometer and two other tests. One test consisted of determining the intensity of a broad-band noise that would just produce about 5 db of temporary threshold shift (TTS) at 4000 cps two minutes after a two-minute exposure. This intensity has been called the critical intensity (CI). The other test consisted of determining the changes in the vascular system upon exposure to up to 100-db noise, as evidenced by changes in the volume of the hands. The apprentices were divided into four groups on the basis of length of employment (one, two, three, or four years). It was found that hearing loss at 4000 cps grows at about a rate of 6 db per year (7 db/year for left ears, 5 db/year for right ears); the noise is said to vary from 80 to 95 db, with peaks of up to 125 db. No correlation, however, could be shown between the hearing loss suffered by the workers and the value of either the CI or the amount of change in hand volume.

NOTE: Although the authors' English summary says, "No correlation was found between the temporary threshold-shift of a patient and his permanent hearing-loss at 4000 cps," they do not present any evidence to this effect: their only data refer to the CI, which is quite a different measure from the TTS produced in the workers by the *same* laboratory-noise exposure. —W.D.W.

Internal Medicine

A Study of Diet, Blood Lipids and Vascular Disease in Trappist Monks. E. P. McCullagh* and L. A. Lewis. New England J. Med. 263:569 (Aug. 22) 1960. (*Department of Endocrinology and Metabolism, Cleveland Clinic Foundation, Cleveland, Ohio.)

Trappist monks were studied in regard to diet, exercise, serum cholesterol, serum lipoproteins, and blood pressure. They were chosen for study because they eat a low-animal-fat diet, live a peaceful life, and have daily physical exercise. It was hoped that such a study might clarify the pathogenesis of certain disorders believed to result from overeating (especially fats) and from nervous tension.

Abstracts

The blood cholesterol averaged lower than that of healthy men of comparable age; the results of this study indicate however, that, in spite of this finding, arterial hypertension is more frequent than in healthy men in the general American population.

The authors conclude that they are willing to accept the concept that abnormally high cholesterol levels may enhance the progress of cardiovascular degeneration and hypertension; but they feel, from this study, the conclusion cannot be drawn that a diet unusually low in fat in the average person will be beneficial in itself in offsetting the advance of cardiovascular degeneration and arterial hypertension. —S.H.S.

Avascular Necrosis of the Femoral and Humeral Heads After High Dosage Corticosteroid Therapy. W. G. Heimann* and R. H. Freiberger. New England J. Med. 263:672 (Oct. 6) 1960. (*Cornell University Medical College. New York, N.Y.)

Four cases of avascular necrosis of the femoral and humeral heads after large doses of corticosteroid drugs are presented. The patients were treated for erythema multiforme bullosum, pemphigus, multiple sclerosis, and thrombotic thrombocytopenia purpura. None of the patients had Gaucher's disease or other systemic disease known to be associated with avascular necrosis.

The authors doubt that the avascular necrosis represented in these cases was secondary to compression fractures in osteoporotic bone. If such were the case, vertebral compression deformities would be expected; further, the necrosis of the humeral head would be difficult to explain on the basis of corticosteroid-induced compression fracture, since this extremity is nonweight bearing.

Avascular necrosis of the femoral head occasionally occurs due to unknown causes. It is not likely that all four cases were of this type; further, all four had one thing in common; namely, therapy with large doses of systemic corticosteroids.

The authors conclude that avascular necrosis may be a serious complication of corticosteroid therapy. —S.H.S.

The Effect of Prior Carbohydrate Intake on the Oral Glucose Tolerance Test. H. L. C. Wilkerson,* F. K. Butler, and J. O.'S. Francis. Diabetes 9:386 (Sept.-Oct.) 1960. (*Diabetes Field Research Unit, Chronic Disease Program, Division of Special Health Services, Bureau of State Services, Public Health Services, U.S. Dept. of Health, Education, and Welfare, Washington, D.C.)

That decreased glucose tolerance may occur among persons on low-carbohydrate diets is well established. The magnitude of this decrease and its practical importance is less well understood. The authors report only 2 of 18 normal experimental subjects giving evidence of impaired glucose tolerance after five days on a 20-gm-carbohydrate, 1,600-calorie diet. Normal glucose tolerance was restored after four days on a 150-gm-carbohydrate, 1,640-calorie diet. It is concluded that adequately nourished persons require no special preparation for a glucose tolerance test. —L.W.

Narcolepsy. R. E. Yoss* and D. D. Daly. Arch. Int. Med. 106:168 (Aug.) 1960. (*Mayo Clinic and Foundation, Rochester, Minn.)

Narcolepsy, often thought of as a neurological curiosity, is, in fact, a common disorder, frequently unrecognized. The fully developed clinical picture includes (1) abnormal sleepiness, (2) catalepsy, (3) sleep paralysis, and (4) hypnagogic hallucinations. These four symptoms are not commonly observed in the same patient, and hence erroneous diagnoses are made. These include hypothyroidism, hypoglycemia, "epilepsy," neurosis, myasthenia gravis, multiple sclerosis, etc.

The author has found control of the excessive sleepiness possible with proper use of an agrypnotic such as methylphenidate. —L.W.

Medical Care Administration

States Plan Aid for Aged Under New Law. Editorial. Mod. Hosp. 95:67 (Dec.) 1960.

The amendments to the social security law enacted by Congress in August have resulted in most states' taking a new look at their health care programs for old-age assistance recipients. The states are practically unanimous in their decisions that a practical, workable solution is not possible under the new legislation. It is probable that the program will be given back to Congress.

Many states are planning to use any new federal monies made available to imporve existing programs under public assistance categories. New legislation will be needed in 39 states to authorize the states to establish the category of medical assistance for the aged. The number of persons eligible for medical assistance to the aged has been estimated by some states as approximately half of all persons 65 and older. Failure of any significant number of states to enact the program and to appropriate adequate funds will undoubtedly increase the pressure on Congress for other solutions. —A.B.

Make Hospitals Public Utilities. W. J. McWilliams.* Hospitals 34:44 (Oct.) 1960. (*Annapolis, Md.)

Voluntary hospitals cannot continue to operate as charitable institutions. It is no longer possible to build, maintain, or expand modern voluntary hospitals by passing the hat. People are beginning to ask why they should contribute to an activity that is primarily an obligation of the government.

Last year, 61% of the patients in Maryland hospitals paid less than cost, and 10% paid nothing at all. To try to make the other 30% pay enough to make up the deficit would be prohibitive. Some hospitals have outside aid such as foundations and endow-

ments. Some use up funded depreciation, some get small grants from local governments, and all of them are continually passing the hat. As the charity dollar shrinks, operating costs keep going up. Hospitals needing to enlarge their plants can get some assistance from governmental sources and sometimes from foundations, but much must be raised by contributions. On this, recent experience has not been good. All the money could be borrowed if they were operating at a profit.

Public utilities say they cannot operate without a profit, and most hospitals are a public utility in every respect except they have no stockholders. They are as important to the public welfare as gas, electricity, and telephone service. If government can guarantee a profit to others, why not to this one? Adequate reserves could then be set up and money borrowed in the open market for needed expansion. Debt could be amortized on favorable terms. Rates might even be reduced.

Voluntary hospitals would have to surrender some measure of their independence. We would have to make sure there were not too many hospitals or wasteful duplication of service. Rates would be determined by the public service commission, and these rates paid by Blue Cross as well as others. Rates would reflect actual cost plus such profits as are necessary for each hospital's own situation.

—A.B.

The Modern Family Physician. R. L. Crawford.* J.A.M.A. 174: 1913 (Dec. 10) 1960. (*Lancaster, S.C.)

About 85% of the illnesses and medical problems of the family can be adequately handled by the family doctor. A student preparing to enter general practice should be experienced in pediatrics, obstetrics, surgery, urology, ophthalmology, dermatology, otolaryngology, and psychiatry. Such a training program should be administered in a manner that will offer the physician certification by a board of general practice. Such a board should be developed by the general practice section of the AMA.

In the course of his everyday work, the modern family physician recognizes the need of the whole community in such fields as public health services, sanitation, living conditions, recreation facilities, religious training, child psychology, and other aspects of general environment. He is in excellent position to advise the public on health matters, but the trend today has been to isolate the physician from his community in a specialist-type practice.

It is apparent that general practice is attracting fewer and fewer physicians and is, therefore, gradually dwindling into extinction. To stem this tide, something will have to be done, not tomorrow, or six to ten years hence, but today. —A.B.

What Is the Future of Plantation Medicine? R. Y. Noda.* Plantation Health 26:4 (Jan.) 1961. (*Waipahu, Hawaii.)

The plantations are going out of the hospital business, the plantation population is decreasing, the number of plantation doctors is increasing, and the hospitalization rate is increasing. Present statistics are based on an older population group. With the improvement in quality of medicine comes a salvage of patients who become challenging medical problems and increase our outpatient visits and hospital days. Obstetrics and pediatrics is a small part of the practice, and geriatrics becomes a larger part.

The method of practice is constantly changing. Most plantations started with one doctor and a few nurses; now most have two or more doctors. Several have contracted out their medical care plans to groups. The pineapple industry is completely out of the medical care business and gives a medical insurance type of coverage. Changes in the method of practice have been tempered by the economic pressure of today.

The plantation physicians owe it to the people they serve to take a more active part in moulding the future of plantation medicine in order to give them the best possible care. —A.B.

Environmental Physiology

Effect of Environmental Temperature on Work and Resting Metabolism. M. S. Malhotra,* S. S. Ramaswamy, and S. N. Ray. J. Appl. Physiol. 15: 769 (Sept.) 1960. (*Defense Science Laboratory, Delhi, India)

Energy metabolism of 18 men varying in age from 21 to 36 years was measured both in the basal state and during military training exercises at various seasons of the year. Outdoor temperatures ranged from 39.0°C (102.2°F) in May to a low of 8.4°C (47.1°F) in December. Basal metabolism of the Indian subjects was 36 Cal/m^2/hr compared with 40 Cal/m^2/hr, which is regarded as normal by American standards. No seasonal variations were noted either in the BMR or in the energy expenditure during exercises, the latter being expressed in calories per kilogram of body weight. The recommendation of the Food and Agricultural Organization's Committee on calorie requirements for a 5% increase in caloric intake for each 10°C fall in environmental temperature is therefore not supported by these experiments, which show no climatic effect on energy requirements either in the basal state or during exercise.

—D.M.

A Unified System for Evaluation and Selection of Heat Stress Candidates. J. Gold.* J. Appl. Physiol. 16:144 (Jan.) 1961. (*Biomedical Laboratory, Aerospace Medical Division, Wright-Patterson Air Force Base, Ohio)

In the final selection of seven astronauts from 31 candidates for the Mercury Project, heat tolerance was one characteristic upon which evaluation of over-all physiological efficiency was based. Good heat tolerance implies the ability to dissipate heat and is inversely related to rate of heat storage

(Cal/m²/hr) in the body during a standard heat exposure.

Heat storage could be predicted from the rise in heart rate (r=0.88). The ratio of heat storage predicted on this basis to actual heat storage (q_e) is called the index of accumulative circulatory strain (I_z). Good heat tolerance is characterized by a low q_e and an I_z of unity or below. In older subjects heat tolerance is generally poor. This is indicated by a high q_e. I_z, however, may be low. This is interpreted as "inflexibility" of the cardiovascular system in the older subject in response to heat strain. —D.M.

Symptoms Resulting from Prolonged Immersion in Water: The Problem of Zero G Asthenia. A. Graybiel* and B. Clark. U.S. Naval School of Aviation Medicine, Research Report 4, July 15, 1960. (*U.S. Naval School of Aviation Medicine, U.S. Naval Aviation Medical Center, Pensacola, Fla.)

Except for very short exposures, very little is known concerning the effects of zero G and its relative importance is space flight. The purpose of this investigation was to study the effects of reduced muscular activity utilizing water immersion as a method of simulating the zero G state. The experimental subjects were four U.S. Naval School of Aviation Medicine enlisted men. During the experimental period of two weeks, they remained immersed in water 10 hours a day, with the remainder of time each day spent in scheduled tests. Every attempt was made to eliminate any type of muscular activity. Tests given each subject were Whipple steadiness test, strength of grip, leg ergograph, body sway, treadmill, tilt-table, and blood tests. The results of the Whipple test indicate there is no substantial decrement in steadiness during such an experimental procedure. Likewise, the strength of grip showed no change related to the time spent in the tank. Results from the leg ergograph showed little change in muscular strength associated with the reduction in muscular activity. Body sway and treadmill tests showed no significant change from the control values. The subject showed a sharp rise in pulse rate and a marked drop in systolic blood pressure when tested on the tilt-table after two weeks in the immersion tank. Blood analyses on 0-12 lipoprotein and the serum cholesterol showed higher values in all subjects after the two week experimental period. One explanation offered for this finding was that exercise tends to lower cholesterol, and, therefore, the inactivity of the subject during the experimental period should have the opposite effect. —R.T.C.

Effect of Sleep on Hypoxic Stimulation of Breathing at Sea Level and Altitude. D. J. Reed* and R. H. Kellogg. J. Appl. Physiol. 15:1130 (Nov.) 1960. (*Department of Pharmacology, University of Utah College of Medicine, Salt Lake City, Utah)

The effect of sleep on the level of hypoxia was studied on sea-level residents before ascending to altitude, during 23 days at 14,250 feet, and after return to sea level. When the subjects were asleep at 14,250 feet, an average fall of 5.7% in arterial O_2 saturation was observed. Owing to the shape of the oxygen dissociation curve, this decrease in O_2 saturation becomes of considerable physiological significance. In other words, when these subjects fell asleep at 14,250 feet, they became as hypoxic as if they had suddenly ascended to about 16,000 feet. These findings help to explain the insomnia, headache, and other symptoms of mountain sickness associated with sojourners in the mountains. —R.T.C.

Radiation Health

Transplantation of Marrow in Man. J. W. Ferrebee* and E. D. Thomas. Arch. Int. Med. 106:127 (Oct.) 1960. (*Cooperstown, N.Y.)

The lifesaving effect of transplants of marrow in animals following lethal exposure to radiation has stimulated interest in the transplantation of human tissue. Except in the case of identical twins, transplanted tissue from one person to another results in an antibody-antigen response. The transplanted tissue is subjected to round-cell infiltration and inflammatory change, and in a week or two the graft is rejected. Subjects in whom cellular response in the lymph centers is diminished by radiation retain grafts for prolonged periods. Even though the graft may eventually be rejected, a lethally irradiated person may be kept alive by bone marrow transfusion from a suitable donor for the four or five weeks required for their own marrow to regenerate from remnants that had escaped destruction during radiation. Experimental work in treating leukemia patients with large doses of whole-body radiation followed by bone marrow transplants indicated that immediate problems such as embolic disaster or other untoward effects have been absent. Also, the acute effects of amounts of radiation presumed requisite for marrow transplantation in man seem not intolerable. To date there has been no evidence of harm from infusion of blood or marrow in the few normal subjects whose radiation injuries have been so treated.

Leukemia patients who have received higher exposure to radiation and apparently more permanent implantation of foreign marrow have had clinical courses suggestive of the graft-versus-host reaction seen in animals. In two, there has been malaise, fever, weight loss, skin rash, digestive upsets, superficial infection, and a remission of leukemia during the period of reaction and persistence of graft function. —W.D.N.

Effect of Soil Nutrients on Plant Uptake of Fallout: Soil Calcium and Potassium Decrease Strontium-90/Calcium and Cesium-137/Potassium Ratios in Plants. E. B. Fowler* and C. W. Christenson. Science 130:1689 (Dec. 18) 1959. (*Health

Division of the University of California, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.)

When lettuce, grass, and alfalfa are grown under controlled soil conditions, the absorption of strontium-90 is progressively inhibited by increasing concentrations of soil calcium. The discrimination against strontium (up to 2.8) depends upon the concentration of soil calcium being greater at low calcium concentrations (3-6 mg Ca/gm soil).

The degree of removal of cesium-137 from soil by plants is less than that of strontium-90. The discrimination against cesium apparently may be as high as 1100 and is dependent upon soil potassium and soil type.

The natural absorption of radioisotopes from soil may be greatly influenced by the depth of feeding of the plant. —W.D.N.

Research in the Radioactive Contamination of the Environment. C. P. Straub.* Arch. Environ. Health 1:302 (Oct.) 1960. (*Division of Radiological Health, Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.)

Surveillance of environmental radiations defines the levels of natural radiation, environmental contamination due to plant and laboratory effluents, and fallout radiation. Radioactivity in Cincinnati samples indicates levels of certain specific radionuclides in air, water, milk, and food. Air particulate radioactivity levels, obtained by gross beta measurements, show an increase in average value from 0.2 $\mu\mu c/M^3$ in 1953 to 4.3 $\mu\mu c/M^3$ in 1957. Rainout activity increased during the same period from less than 0.1 curie/sq. mi. to about 0.54 curie/sq. mi. Estimation of the strontium-90 exposure showed that air contributes the least strontium, while water (cistern or surface), milk, and food contribute about equal amounts. Compared with the permissible intake of strontium for water (176 $\mu\mu c$/day), it was estimated that the daily intake (1957-1958) from these sources represents 9% to 19% of the allowable strontium-90 value. —G.L.V.

Some Delayed Effects of Atom-Bomb Radiations in Mice. A. C. Upton,* A. W. Kimball, J. Furth, K. W. Christenberry, and W. H. Benedict. Cancer Res. 20:1 (Sept.) 1960. (*Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tenn.)

Nearly 5,000 mice were exposed to an experimental nuclear detonation. The surviving mice were observed for delayed effects of irradiation until natural death. The observed life-shortening effect was attributable to premature onset of all diseases associated with general senescence rather than a specific cause of mortality. Onset of thymic lymphoma was hastened more than other diseases, especially in high-dose groups. There was no linear relation between tumor incidence and dose. Most neoplasms were less common after large radiation doses than after intermediate doses. The incidence of pulmonary adenomas, breast sarcomas, and nonthymic lymphomas decreased in irradiated animals, while the incidence of other neoplasms increased. The relation between radiation dose and tumor incidence varied markedly from one neoplasm to another. Other effects noted in irradiated animals were depigmentation of the hair, cataracts, premature iris atrophy, and radiation nephritis. —G.L.V.

Consideration of the Theory of Bone Marrow Grafting as Treatment of Radiation Damage. L. G. Lajtha.* Brit. J. Radiol. 33:588 (Sept.) 1960. (*Radiobiology Laboratory, Department of Radiotherapy, Churchill Hospital, Oxford, England.)

Bone marrow is called a radiosensitive organ because the cellular damage appears quickly, since marrow cells die more rapidly than the regenerative cells can replace them. The evidence for bone marrow cells' being more radiosensitive than other cells has not been proved, however. It appears that acute whole-body radiation which would allow survival of the individual with marrow grafting would also permit survival and recovery of marrow cells if careful substitution therapy is used. Spontaneous regeneration of marrow cells is probable if sterile nursing techniques, antibiotic therapy, and frequent platelet transfusions prevent fatal complications. The limiting factor then will be damage to the intestinal epithelium. —G.L.V.

Industrial Hygiene Controls

Air Supply—Need, Distribution and Cost. Division of Industrial Hygiene Staff.* Michigan's Occup. Health 6 (Fall) 1960. (*Michigan Department of Health, East Lansing, Mich.)

The entire issue of this publication is devoted to the need for air supply to industrial work areas as well as to problems involved in the proper distribution of make-up air. A significant portion of the discussion involves the economics of make-up air. Detailed formulas are presented that make it possible to calculate the cost of 1,000 cu ft per minute of tempered air supply when gas or fuel oil is used.

The magitude of the problem is exemplified when calculations show that a standard 6 by 8 ft. paint-spray booth will need "130 tons of air during an eight hour working day." Practical solutions for air supply problems are presented in narrative and pictorial forms. —L.W.S.

The Effect of Heat on the Industrial Worker. A. R. Lind.* Ann. Occup. Hyg. 2:190 (Sept.) 1960. (*N.C.B. Physiological Research Station, Department of Human Anatomy, Oxford, England.)

Variations of temperature, humidity, and air movement beyond a relatively narrow range affect the general health and productivity of the worker at his place of employment. The writer recognizes the need to determine the meaning of "too hot" in the industrial context and proceeds to define

and explain the relevant factors and concepts previously developed by investigators in the field. Also, he shows how much presently available knowledge may be used. The subject is discussed under the following three subheadings.

"Bodily Heat Exchanges" outlines both the theoretical and practical aspects involved in the maintenance of thermal equilibrium in the human body. Equations derived through research, using male subjects under controlled conditions, offer a starting point from which to consider the effect of such variables as the actual working environment, clothing, and energy expenditure for the job.

"Heat Stress Indices" deals with the bases for and limitations of several methods which integrate various environmental measurements such as temperature, humidity, and air movement. Resultant figures can indicate whether the area is within conditions which will permit, limit, or prohibit the productive performance of workers. This section also discusses such terms as "upper tolerable thermal limits" and "permissible environmental limits for work" based on these indices and their application in various countries and industries.

"Remedial Measures" applies the foregoing material to a hypothetical set of environmental factors as a means of illustrating how such information can be used. Simple, practicable approaches to some specific situations are offered.

The author provides numerous references for most of the points he presents. —M.K.

What's New in Ventilation for 1960. J. C. Barrett.* Transactions of 22nd Annual Meeting of American Conference of Governmental Industrial Hygienists, p. 24 (April) 1960. (*Michigan Department of Health, East Lansing, Mich.)

The author discusses new engineering developments in three basic work areas, namely, dustless drilling, ventilation of automatic buffing machines, and ventilation of a chemical laboratory.

To achieve dustless drilling, manufacturers are using a "special drill bit with a number of exhaust holes." In operation, dust-containing air is exhausted through the holes to a collector. Usually, the exhaust systems are an intergral part of the drill. Chief use of such drills is in mining, rock drilling, and tunnel operations. The U. S. Bureau of Mines has approved many of the dustless drills; however, it must be noted that the word "dustless" is not absolute. For approval as a dustless drill, the U. S. Bureau of Mines' standard requires that "not more than 10 million particles" of dust be in the operator's breathing zone. Manufacturers of such equipment are cited.

An installation of a buffing operation is described whereby a four-wheel automatic straight-line buffer is enclosed. This method of dust control did not produce any difficulties with set-up, buff replacement, or adjustment.

The adequate ventilation of chemical laboratories has always presented a serious engineering problem. Proper chemical-hood performance requires that large volumes of make-up air be supplied. Normally, the delivery of this mass of make-up air created problems in draft control as well as in design of ducts. To eliminate these basic problems, the author recommends the installation of a false ceiling "made up of 12″ × 12″ metal tile; each tile has approximately 1,000 three-thirty-seconds-inch stamped holes."

All existing ducts are removed, and new air ducts deliver air to this newly created plenum chamber to be uniformly discharged through the holes in the tile. In calculating air requirements for the laboratory, it is advisable to "keep the laboratory under negative pressure and prevent any spread of materials which might be spilled outside of the hood." —L.W.S.

Surgery

Adduction Injury of the Knee with Rupture of the Common Peroneal Nerve. M. M. Novich.* J. Bone & Joint Surg. 42A:1372 (Dec.) 1960. (*299 Clinton Ave., Newark 8, N. J.)

Sudden adduction of the leg on the thigh may produce extensive ruptures of the capsule and ligamentous structures on the lateral aspect of the knee with stretching or tearing of the common peroneal nerve. The nerve may be torn or stretched over a considerable distance. Additionally, there may be rupture of the lateral capsule at its tibial attachment, avulsion of the biceps tendon from the fibula, and tear or avulsion of the lateral collateral ligament. Further injury may cause separation of the iliotibial tract, tear of the popliteus muscle, and cruciate ligament injury.

A case is reported of an athlete injured in a football game when his knee sustained a force which buckled the knee. On the following day the patient was found to have a foot drop. Twelve days after the injury the knee was explored and an avulsion of the biceps tendon, a tear of the lateral collateral ligament and lateral capsule at the tibial attachment, and a peroneal nerve disruption at the level of the fibular head were found. The ligaments and capsule were repaired. At five weeks a repair of the nerve was carried out; to achieve this, considerable resection of the nerve was required. Examination at 18 months revealed a partial sensory return but no motor return. Foot stabilization was performed. The author reviewed the literature and noted 16 other such cases reported. In polling experienced surgeons, he found 10 other such cases. —O.M.

Injury to the Medial Ligament of the Ankle. O. S. Staples.* J. Bone & Joint Surg. 42A:1287 (Dec.) 1960. (*Mary Hitchcock Memorial Hospital, Hanover, N. H.)

In a study of 110 patients with a tear of the deltoid ligament and lateral dislocation of the talus, 57 of the tears were considered complete and 53 incomplete. This study is primarily an

end-result evaluation of 83 patients who were treated conservatively. Immediately after injury abnormal mobility of the talus may be noted, but when pain and spasm develop, this is no longer apparent. With or without fibular fracture, when swelling exists over the medial and anterior aspects of the ankle, tear of the deltoid ligament must be considered. Routine roentgenograms are taken plus a mortice view, i.e., one taken anteroposterior of the ankle with the knee internally rotated 20 degrees. On these films a talar displacement may be apparent. If it is not, and suspicion is still high, a properly taken stress x-ray under general anesthesia is advised. The author advises closed reduction and the application of a long leg cast with the foot in full internal rotation and adduction for three weeks followed by a second cast for three to five weeks in a lesser degree of inversion. Open reduction is indicated if closed reduction is not achieved or if the injury is primarily open. In most of Staples' cases there was an associated short oblique fracture of the fibula. Of the 83 patients treated in this manner, 87% had a good result and 13% had a residual disability, the degree of disability being mild.

—O.M.

Experimental Toxicology

Toxicity and Personal Decontamination of Boron Hydride Propellant Fuels. S. Rothberg,* J. L. Colbourn, and R. Salvatore. Army Chemical Center, Md. PB 161772 (Feb.) 1960. (*Chemical Warfare Laboratories, Army Chemical Center, Md.)

The toxicity of liquid boron hydride fuels (BHF) of the HEF-3 and HiCal class was determined for rats, guinea pigs, rabbits, and cats by administration of the compounds intravenously, intraperitoneally, orally, ocularly, and cutaneously. The fuels were highly toxic by all routes of administration and present serious hazards by oral ingestion, eye contact, and skin absorption. A 2.8% ammonia solution is effective as a flushing agent in removing the fuels from the skin of test animals and is presumed to be effective for man. (It is important that the ammonia solution be flushed and swabbed and not left in contact with the skin because the reaction product is itself toxic.) Dilute ammonia solution is superior to 1% aqueous triethanolamine as a decontaminant for BHF. Surgical glove material and silicone ointments provided only limited protection against BHF, the former being the more effective.

—Authors' summary, modified by R.E.E.

Studies on the Toxicity of Glycidaldehyde. C. H. Hine,* R. J. Guzman, M. K. Dunlop, R. Lima, and G. S. Loquvam. Arch. Environ. Health 2:23 (Jan.) 1961. (*University of California Medical Center, San Francisco)

Animal studies indicated that glycidaldehyde has mild radiomimetic effects (lowered leukocyte counts and percentage of polymorphonuclear cells after repeated intravenous (IV) injection of 25 mg/kg in rabbits and decrease in nucleated marrow cell count in rats after 60 four-hour exposures to 20 ppm or higher of the vapor). It has a pronounced parasympathomimetic effect on IV injection. Organic damage consists of pulmonary irrita- and testes. It has ample warning properties as a skin and mucous membrane irritant, 5 ppm in air being entirely unacceptable from the comfort standpoint. A threshold limit of 2 ppm is suggested.

—R.E.E.

Effects of Diglycidyl Ether on Blood of Animals. C. H. Hine* and others. Arch. Environ. Health 2:31 (Jan.) 1961. (*University of California School of Medicine, San Francisco)

Diglycidyl ether is described as a hazardous compound, having a radiomimetic effect in rats, rabbits, and dogs via the skin absorption, inhalation, and injection routes. It is capable of lowering the leukocyte count, altering the ratio of polymorphonuclear to mononuclear cells, depressing the bone marrow, and altering the myeloid erythroid ratio in rats after repeated exposure to 3 ppm. The lowest single dose producing such effects was 12.5 mg/kg intravenously to dogs. The outstanding visceral effect was depletion of lymphoid organs, with occasional changes in the testes, adrenals, and liver, and often in the lungs. It is extremely damaging to the skin. Epoxy resin A and triglycidyl phosphate show similar radiomimetic properties, the former being far less active, however.

—R.E.E.

Toxicology of Dimethylacetamide. H. J. Horn.* Toxicol. & Appl. Pharmacol. 3:12 (Jan.) 1961. (*Hazleton Laboratories, Falls Church, Va.)

Repeated skin applications of dimethylacetamide to dogs at dosage levels of 0.1-4.0 ml/kg and repeated vapor inhalation exposures of rats and dogs to atmospheric concentrations of 40, 64.4, 103, and 195 ppm revealed that the compound is readily absorbed into the blood stream by either route of administration and that repeated exposures to low levels can result in liver damage. The latter effect was observed in all test animals at levels greater than 0.1 ml/kg dermally and 40 ppm by inhalation.

—R.E.E.

Toxicologic Information on 2,4,5-Trichlorophenol. D. D. McCollister,* D. T. Lockwood, and V. K. Rowe. Toxicol. & Appl. Pharmacol. 3:63 (Jan.) 1961. (*Dow Chemical Company, Midland, Mich.)

Repeated oral dosing of rats and rabbits with 2,4,5-trichlorophenol revealed a low degree of oral toxicity. The oral LD_{50} for rats is 2.96 gm/kg. Skin irritation and sensitization studies on humans showed that the compound in a concentration of 5% in sesame oil had a mildly irritating effect, but no evidence of sensitization was seen. Industrial use of the material is not expected to present any unusual health hazards, and good personal

hygiene practices should adequately protect personnel from harmful exposures. —R.E.E.

Studies on Calcium Cyanamide Poisoning. H. Murakami.* Indust. Med. & Surg. 30:35 (Jan.) 1961. (*Kyoto University, Japan)

Various studies are summarized on a commercial fertilizer consisting mainly of calcium cyanamide but also containing various cyanide compounds, quick lime, carbon, etc. The studies suggest that thiol compounds do not combine with $CaCn_2$ and therefore are not useful antidotes. One of the mechanisms of lowered ethyl alcohol tolerance associated with $CaCN_2$ may be due to the accumulation of acetaldehyde caused by its inhibition of acetaldehyde oxidase. In addition, however, it is a producing source of HCN and ammonia in the body and also an inhibitor of ammonia metabolism. The increase of ammonia and HCN may lower resistance and lower the alcohol tolerance. (Complete study reported in Japanese J. Nation's Health 28:263, 1959). —R.E.E.

Mental Health

New Psychotherapeutic Agent, Chlordiazepoxide. J. M. Tobin* and N. D. C. Lewis. J.A.M.A. 174: 1242 (Nov. 5) 1960. (*Bureau of Research in Neurology and Psychiatry, Princeton, N. J.)

A recent social psychiatric survey of a central residential New York area reveals that anxiety is present in 75% of the study group. This is in the "age of anxiety."

A new agent for relief of related symptoms is reported in this article. The study is based on 135 female and 77 male patients, ages ranging from 12 to 76 years, and the duration of psychiatric illness from 2 months to 27 years. The authors state that "a clinically demonstrable improvement in 170 (80.2%) of a series of 212 patients who suffered from directly perceived anxiety and related symptoms and were treated with chlordiazepoxide indicates that this drug is an active psychopharmacological agent." The side effects are transient drowsiness and ataxia, often related to overdosage. This drug is known by the trade name of "Librium." It is considered that this drug has three different pharmacological actions: an antianxiety, a sedative, and a stimulating effect. —G.C.T.

Communication and Conformity. R. Bellows.* Personnel Administration 23:20 (Sept.-Oct.) 1960. (*Rutgers University, New Brunswick, N. J.)

Some critics of communication in groups contend that such activity causes a conformity which leads to a "vegetable equilibrium." The author argues that this is not the case and that "participation results in creative contribution to the organization and to the small group." This participation is based upon a need to solve mutual problems. Bellows discusses adequacy of communication and reports some studies which attempt to measure the efficiency of employee communications. At each higher hierarchial level subordinates feel that their superiors do not understand their problems, whereas the superiors believe that they do. Difficulties in communicating may arise from a lack of rapport and lack of empathy. A failure of empathy and rapport may be due as much to a failure of the receiver as to that of the speaker. The distinction between listening and hearing is made. Extreme lack of understanding may indicate that faulty communications are steming from a lack of mutual goals.

To sum up, communications of all kinds are essential to group action. Motivation is necessary for good communication, and group participation can be creative and improve morale. —G.C.T.

Mental Health Problems of Automation. World Health Organization Technical Report Series No. 183, 1959.

There are three types of automation. Transfer automation is examplified by the well-known assembly line. The second type involves automatic control over manufacturing processes where there is a feed-back of information into the mechanical system analogous to a governor on a steam engine. The third and most important type is described as computer automation, processing of complex data by the electronic digital computer with an extension of this automatic control on complex production processes. It is considered that this type of automation will produce the most significant changes in work. Automation is often considered to be "de-humanizing;" yet it may remove a great deal of drudgery from work. There are emotional reactions to the very mention of "automation." Automation will affect the worker psychologically and physiologically and will bring about social changes which also will affect the individual. It may produce improvements in mental health possibly because of the decrease in repetitive work but also may act as a new source of strain.

The second section covers the mental health consequences of strain among workers in automated plants. The individual reacts emotionally to the anticipation of new automation techniques. This invites fears and also hopes. The actual changes brought about by the new working conditions will affect the individual and may produce psychological strain. The changes include a decrease in manual work and an increase in perceptual activity. The worker is now in a more abstract relationship to his work which may be good for some but a strain for others. Other changes include the need for increased attention, with or without motor discharge, increased solitariness of work, and probably reduced opportunities for initiative. —G.C.T.

About the Authors

► GERALD GORDON, M.D., is Chief of the Psychiatric Section, Medical Division, E. I. du Pont de Nemours & Company, and has been on the medical staff of this company since 1946. He attended the Wilmington (Del.) High School. Graduating from the University of Alabama in 1934 with a B.A. degree, he continued there for two years in the School of Medicine. In 1936, he transferred to the University of Louisville School of Medicine, receiving the M.D. degree in 1938.

After an internship at the California Hospital in Los Angeles (Calif.), Dr. Gordon went into private practice for two years. He volunteered for emergency medical service in England in 1941, and from 1942 to 1945 served as a medical officer in military psychiatric hospitals with the U.S. Army in England. Returning to Wilmington after the war, he had a private psychiatric practice for one year before joining the Dupont Company.

Dr. Gordon is a member of the American Medical Association, the American Psychiatric Association, and the American Academy of Occupational Medicine. He is certified in occupational medicine by the American Board of Preventive Medicine. He is the author of the article in this issue, "Personal Responsibility in Accidents."

► PHILIP C. HOLZBERGER, M.D., is senior author of the article in this issue, "Industrial Medical Aspects of the Acute Dysentery Syndrome." He received the B.S. degree from the University of Notre Dame, South Bend, Ind., in 1945 and the M.D. degree in 1946 from Long Island College of Medicine (now the State University of New York College of Medicine at New York City), Brooklyn, N. Y. After a rotating internship at St. Vincent's Hospital, New York, and two years in the army as a ward officer on the tuberculosis service at Fitzsimons General Hospital, Denver, Colo., he went to Europe for five years of training in branches of internal medicine at hospitals in France, England, and Sweden.

Dr. Holzberger became Senior Physician at Undercliff Hospital, Meriden, Conn., in 1954, and for 18 months was concerned with tuberculosis and geriatrics. He then became a medical examiner for Standard Oil Company (New Jersey) at the firm's home office in New York. He transferred to an affiliated company, the Lago Oil and Transport Company, Ltd., Aruba, N. W. I., where he remains on the staff of the Employee Medical Center.

► STANLEY SCHOENFELD holds a B.S. degree (1950) from Long Island University, Brooklyn, N. Y. He was a pharmacist's mate in the United States Navy, 1946-1948, and then worked as clinical laboratory technician at hospitals in Ohio and New York. He is a registered medical technologist, a certified parasitology technologist, and a certified medical technology instructor. He is co-author of the article in this issue, "Industrial Medical Aspects of the Acute Dysentery Syndrome."

► MORRIS BRAND, M.D., Medical Director of the Sidney Hillman Health Center, New York, N. Y., is author of the article in this issue "The Four Medical Centers of the Amalgamated Clothing Workers of America."

Dr. Brand received the B.A. degree from George Washington University in 1929 and the M.D. degree four years later from the same institution. After an internship at Montefiore Hospital, New York, N.Y., he continued training at that hospital over the next four years in pathology and in chest diseases. He took his first appointment in medical care administration in 1940 as director of an experiment in low-cost medical care provided to residents of a federal and city housing project in New York. This was followed by a year as Medical Advisor on the staff of the mayor's Committee on Medical Care and seven years as Associate Medical Director of Health Insurance Plan of Greater New York (HIP). He took his present position in 1951. He is the author of a series of articles on medical care administration and is medical consultant in this field to several labor unions. He is a Fellow of AMA and of IMA.

► GEORGE L. ENGEL, M.D., joined the faculty of the University of Rochester School of Medicine in 1946, and has been Professor of Psychiatry since 1957 and Associate Professor of Medicine since 1949. He is Associate Editor of *Psychosomatic Medicine*, and a member of the editorial boards of two other professional journals, *Perspectives in Biology and Medicine* and *Journal of Psychiatric Research*. He is a past president of the American Psychosomatic Society and a member of the American Psychoanalytic Association, the American Psychiatric Association, the American Society for Clinical Investigation, the American Society for Electroencephalography, and Sigma Xi.

Dr. Engel received his B.A. degree from Dartmouth College in 1934 and his M.D. degree from Johns Hopkins University School of Medicine in 1938. He served his internship at Mount Sinai Hospital, New York City and was a Research Fellow in Medicine at Harvard Medical School in 1941 and 1942. He spent the next four years first as an instructor, then as Assistant Professor of Medicine, and of Psychiatry at the University of Cincinnati School of Medicine.

The article "'Psychogenic' Pain" which appears in this issue was presented in substance by Dr. Engel at the Industrial Medical Association's 1960 annual meeting.

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People and Events

► FRANK PRINCI, M.D., has been appointed Medical Director of Ethyl Corporation, and LESTER W. SANDERS, SR., M.D., has been appointed Associate Medical Director. Both will have offices in Cincinnati and will supervise all company medical operations, domestic and foreign. DR. PRINCI, who formerly was Associate Medical Director, succeeds KARL V. KITZMILLER, M.D., who has been named Staff Medical Advisor.

DR. PRINCI has been associated with Ethyl Corporation's medical activities for the last 12 years. He is Professor of Industrial Medicine and Assistant Director of the Institute of Industrial Health at the University of Cincinnati, and Associate Director of the University's Kettering Laboratory. He received his M.D. degree from the University of Colorado in 1941 and did postgraduate work there as a Rockefeller Fellow in industrial hygiene and general medicine. He was a Research Assistant in the Department of Clinical Physiology at the Trudeau Foundation, Saranac Lake, N. Y., from 1946 to 1947.

DR. PRINCI is a member of the editorial boards of the *Journal of Occupational Medicine* and the *Archives of Environmental Health*, and is the author of many publications in the field of clinical toxicology. He is a diplomate and trustee of the American Board of Preventive Medicine, and was Secretary of the American Medical Association's Section on Preventive Medicine from 1952 to 1960, and Vice-Chairman from 1960 to 1961. He is a Fellow of the Industrial Medical Association, the American College of Physicians, the American College of Chest Physicians, the American Academy of Occupational Medicine, the American Public Health Association, and the American Association for the Advancement of Science. He is also a member of the American Trudeau Society, the American Industrial Hygiene Association and Sigma Xi. His special appointments include: consultant in medicine, Los Alamos Medical Center; consultant, Subcommittee on Chemical Poisoning, American Public Health Association; consultant in occupational diseases, Air Materiel Command, U.S. Air Force; consultant to the Surgeon General of the U.S. Army, and a member of the Scientific Advisory Board of the U.S. Air Force.

Frank Princi, M.D.

DR. SANDERS, who has been named Associate Medical Director, has been associated with the Company since 1925. He received his M.D. degree from the University of Cincinnati in 1928. He has been Assistant Professor of Industrial Medicine in the Department of Preventive Medicine and Industrial Health at the University of Cincinnati since 1949. He is a member of the American Medical Association, the American Academy of Occupational Medicine, and a Fellow of the Industrial Medical Association. He is a diplomate of the American Board of Preventive Medicine and has written numerous articles and reports on his investigative studies.

DR. KITZMILLER, who is now Staff Medical Advisor, has been associated with Ethyl for 35 years. He received his M.D. degree from the University of Cincinnati in 1923 and has served many years as Associate Professor in the Institute of Industrial Health in the University's College of Medicine. He is a Fellow of the Industrial Medical Association, and the American College of Physicians. He is a diplomate of the American Board of Preventive Medicine and of the American Board of Internal Medicine.

IMA Elects Officers and Directors at Los Angeles

At the annual business meeting of the Industrial Medical Association held April 12 in Los Angeles, the following officers were elected: GRADIE R. ROWNTREE, M.D., President; H. GLENN GARDINER, M.D., President-Elect; JOHN L. NORRIS, M.D., First Vice-President; EDWARD J. SCHOWALTER, M.D., Second *Vice-President;* EMMETT B. LAMB, M.D., Secretary; JERMYN F. MCCAHAN, M.D., Treasurer.

Elected to the Board of Directors for three-year terms were PRESTON N. BARTON, M.D.; JOHN F. SHRONTS, M.D.; GORDON A. SINGLAIR, M.D.; RICHARD A. SUTTER, M.D.; and ROBERT A. WISE, M.D.

A complete report of the Association's 46th annual meeting will be published in the June, 1961, issue of the *Journal of Occupational Medicine.*

► WILLIAM P. SHEPARD, M.D., retired on April 1 as Chief Medical Director of the Metropolitan Life Insurance Company. He has opened a limited consulting practice in industrial medical administration, medical communication and public health education, with offices in New York City.

For many years DR. SHEPARD has been recognized as one of the nation's outstanding public health authorities. He was chairman of the Council on Occupational Health of the American Medical Association until January of this year. His appointments and honors are many. He was a member of the Health Resources Advisory Committee, Office of Defense Mobilization, and of the national advisory committee on health to the Selective Service System from 1945 to 1957. He received the American Public Health Association's coveted Albert Lasker Award in 1956, and was honored by the Industrial Medical Associa-

tion in 1960 as the Sappington Memorial Lecturer. He is a founder and a diplomate of the American Board of Preventive Medicine.

DR. SHEPARD received his medical degree from the University of Minnesota in 1922 and a master's degree in public health from the same institution two years later. He served the University as an Instructor and assistant director of Student Health Service before returning to his home state of Iowa to engage in private practice. In 1924 he went to Berkeley, California, as Medical Director of the city's health center and public school system. Two years later he was appointed Assistant Secretary and Welfare Director of the Metropolitan's Pacific Coast Head Office. He transferred to the Company's Home Office in New York in 1953, where, after a succession of promotions, he became Chief Medical Director in 1959.

► JAMES H. STERNER, M.D., Medical Director of Eastman Kodak Company, is the first industrial physician to be elected president of the National Health Council. He took office at the Council's annual meeting of delegates in New York on March 16.

► VALLIANT C. BAIRD, M.D., has been appointed to the newly-created position of Medical Director in the headquarters organization of Humble Oil and Refining Company, Houston, Texas. He has been serving as Chief Physician of the Company's Humble Division. In his new position, he will be responsible for coordination of all medical activities within the Company.

DR. BAIRD attended Tulane University where he was awarded a bachelor of science degree in 1925 and a medical degree in 1928. He served his internship in New Orleans and in 1931 became Assistant Medical Director of Standard Oil Company of Louisiana. He joined Humble in 1935 as Assistant Chief Physician and was named Chief Physician in 1944.

DR. BAIRD is certified in occupational Medicine by the American Board of Preventive Medicine and is a Fellow of the American College of Preventive Medicine. He is chairman of the Council on Industrial Health of the Texas Medical

Richard W. Stone, M.D.

Association and is a member of the Council on Occupational Health of the American Medical Association. He is past president of the Texas Industrial Medical Association and a Fellow and past director of the Industrial Medical Association.

► RICHARD W. STONE, M.D., Assistant Medical Director, New York Telephone, has assumed responsibility for medical activities in the Bronx and Westchester areas of the company, according to KENNETH L. STRATTON, M.D., Medical Director, Manhattan-Bronx-Westchester.

DR. STONE received his M.D. degree from the University of Wisconsin in 1945 and completed his internship at the University of Oregon's Hospitals and Clinics in Portland. After two years in the U.S. Army, he engaged in private practice for the next few years. During the academic year of 1950-51, he attended a postgraduate Medical Federation training course at the University of London. The following year he took an Assistant Residency at the Massachusetts Memorial Hospital, Boston University, and after a year as a U.S. Public Health Service Fellow in the hemodynamic laboratory at the same hospital, he accepted an appointment as Research Assistant at St. Bartholomew's Hospital in London. On his return to the United States he received an appointment in the pulmonary laboratory at the State University of New York in Brooklyn. It was during this time that he first became as-

Major Gen. Richard L. Bohannon

sociated with the New York Telephone Company as a part-time examining physician. In 1955 he became a full-time staff physician. DR. STONE is also Assistant Professor of Clinical Medicine on the chest disease service of Cornell-New York Hospital Medical Center.

► MAJOR GEN. RICHARD L. BOHANNON, head Air Force surgeon with the Pacific Air Forces for the past three years, will become Deputy Surgeon General, United States Air Force, in June. As top USAF medical officer in the Pacific/Far East area, GENERAL BOHANNON supervised the administration and operation of 14 Air Force hospitals and dispensaries at bases throughout Japan, Korea, Okinawa, Taiwan, and the Philippines. He will leave Hawaii in May for his new assignment at USAF headquarters in Washington, D.C.

GENERAL BOHANNON studied at Southern Methodist University and graduated from Baylor College of Medicine in 1932. He interned at the Dallas City-County Hospital, and has served in the Medical Corps of the Army and of the Air Force for more than 26 years. He is a member of the Industrial Medical Association, the Aerospace Medical Association, the American Medical Association, the Civil Aviation Medical Association, and is a diplomate of the American Board of Preventive Medicine, certified in the specialty of aviation medicine.

► Five Americans will present papers at the Third World Congress on the Prevention of Occupa-

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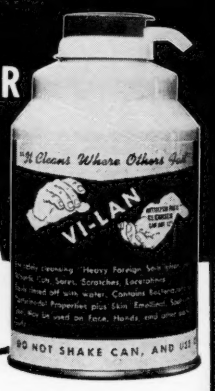

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People and Events

tional Risks to be held May 22-27 at the Palais de Chaillot in Paris, France. The speakers and their subjects are: EDGAR GOLDSTINE, consulting safety engineer, San Francisco—"Progress in the Technical Disciplines"; ALFRED LATEINER, safety consultant, New York City—"Training Supervisors, Accidents Control"; HAROLD J. MAGNUSON, M.D., Chief, Division of Occupational Health, U.S. Public Health Service, Washington, D.C. —"Occupational Health Research in the U.S.A."; S. CHARLES ROTHMANN, engineer, Washington, D.C. —"The Role of the Engineer in the Prevention of Occupational Risks"; and MITCHELL ZAVON, M.D., University of Cincinnati Kettering Laboratory—"Safe Work with Pesticides."

► American Industrial Hygiene Conference was held at the Sheraton-Cadillac Hotel in Detroit, April 10-13. More than 700 persons registered for the meeting. The American Industrial Hygiene Association and the American Conference of Governmental Industrial Hygienists were the two participating organizations.

W. G. HAZARD, Owens-Illinois Glass Company, was elected President of the American Industrial Hygiene Association. Other officers and directors elected were as follows: President-Elect — KENNETH M. MORSE, U.S. Steel Corp.; Secretary—WILLIAM S. JOHNSON, Bethlehem Steel Co.; Treasurer—HERBERT STOKINGER, Ph.D., Industrial Hygiene Field Headquarters, U.S. Public Health Service; Executive Secretary—GEORGE D. CLAYTON, George D. Clayton and Associates; directors—JACOB CHOLAK, Ch.E., Kettering Laboratory, University of Cincinnati College of Medicine; CHRISTINE EINERT, M.D., California Department of Public Health; and HAROLD PAULUS, Ph.D., University of Minnesota.

At the AIHA annual banquet, the Cummings Memorial Award was bestowed posthumously on MANFRED BOWDITCH, who was Director of Health and Safety of the Lead Industries Association from 1948 until his death on June 29, 1960. He graduated from Harvard University in 1912 and later became an instructor in industrial hygiene at the Harvard School of Public Health. In 1925 MR. BOWDITCH was employed as a hygienist by the General Electric Company and is believed to be the first full-time industrial hygienist in the United States. He was a lecturer and author and his contributions to the field of industrial hygiene are many. The Award was accepted for MRS. BOWDITCH by THOMAS L. SHIPMAN, M.D.

Also honored at the AIHA banquet were four pioneers of industrial hygiene who were presented with honorary membership awards. JACK C. RADCLIFFE of Ford Motor Company, retiring AIHA president, made the presentations to DR. ETHEL BROWNING of London, pathologist and author; WOLFGAN FELIX VON OETTINGEN, formerly of the National Institutes of Health, one of the nation's leading toxicologists; CLARENCE D. SELBY, M.D., former medical consultant for General Motors Corp.; and FRANK A. PATTY, former head of the industrial hygiene department, General Motors Corp.

American Conference of Governmental Industrial Hygienists has elected W. L. WILSON, M.D., as Chairman for the coming year. DR. WILSON is Chief, Occupational Health Section, North Carolina State Board of Health. ANDREW D. HOSEY, Chief, Training Operations Section, Division of Occupational Health, U.S. Public Health Service, was elected Secretary-Treasurer. The election was held at the organization's annual meeting in Detroit on April 11.

At the meeting, the ACGIH presented its Award of Merit to HERVEY B. ELKINS, PH.D., Director of the Division of Occupational Hygiene, Massachusetts Department of Labor and Industries. DR. ELKINS was cited for his outstanding and sustained contributions to industrial hygiene and to governmental industrial hygiene in particular. He was especially commended for (1) his work in validating and establishing threshold limit values through careful analytical chemical examinations and observations of the response of workers at specific levels of exposure; (2) his correlation of atmospheric exposure levels with corresponding

chemical levels found in the blood or urine of the exposed worker; (3) his publication of an extremely useful and authoritative reference book which has made his studies available to others; (4) his long-time efforts in the development and adoption of effective labelling regulations for hazardous chemicals used in our nation's workplaces; and (5) for his development of procedures for the effective operation of an industrial hygiene program in an official governmental agency.

► The Council on Occupational Health of the American Medical Association announces the program for the 21st Annual Congress on Occupational Health to be held at the Brown Palace Hotel in Denver, Colo., October 3 and 4. The program follows:

TUESDAY MORNING: Presiding—JAMES H. STERNER, M.D., Chairman, Council on Occupational Health, and Medical Director, Eastman Kodak Company; Welcome—CYRUS W. ANDERSON, M.D., President, Colorado State Medical Society; Greetings—FRANKLIN D. YODER, M.D., Director, Division of Environmental Medicine, American Medical Association; "Problems in Occupational Dermatoses"—DONALD J. BIRMINGHAM, M.D., Medical Director, Chief, Dermatology Section, Public Health Service Occupational Health Research and Training Facility; "Radioactive Material in the Body—Detection and Treatment"—W. DAGGETT NORWOOD, M.D., Manager, Health Operation, General Electric Company, Hanford Atomic Products Operation; "Diagnosis of Occupational Illness by the General Practitioner"—ELSTON L. BELKNAP, M.D., Professor and Director of Department of Occupational and Environmental Medicine, Marquette University School of Medicine; "Relationship Between the Plant Physician and the Family Physician"—HENRY F. HOWE, M.D., part-time industrial physician and member, Council on Occupational Health Committee on Public and Professional Affairs.

TUESDAY AFTERNOON: Presiding—V. C. BAIRD, M.D., member, Council on Occupational Health and Medical Director, Humble Oil and Refining Company; "Efficient Utilization of the Worker"—ROBERT R. YANOVER, M.D., Chairman, Medical Advisory Board of Human Resources Foundation and of Abilities, Inc.; Symposium: "Specific Problem Areas in Efficient Utilization"—"The Woman Worker"— R. LOMAX WELLS, M.D., Medical Director, The Chesapeake and Potomac Telephone Companies, and member, Council on Occupational Health Committee on Public and Professional Affairs; "The Worker with a Neurological Disorder"—HARRY E. TEBROCK, M.D., Medical Director, Sylvania Electric Products, Inc.; "The Worker with Emotional Problems"—LEONARD E. HIMLER, M.D., Mercywood Sanitarium; "The Older Worker"—CECIL WITTSON, M.D., Director, Psychiatric Institute, University of Nebraska; "The Role of the Occupational Nurse"—SARA P. WAGNER, R.N., Director of Nurses, Standard Oil Company (N.J.).

TUESDAY EVENING, annual banquet: Presiding—JAMES H. STERNER, M.D.; Address—"Problems of Survival in Space"—JAMES G. GAUME, M.D., Chief, Space Biotechnology, The Martin Company; Awards—annual award of the President's Committee on Employment of the Physically Handicapped by GEN. MELVIN J. MASS, chairman, and annual presentation of awards and fifty-year pins of the Colorado State Medical Society by CYRUS W. ANDERSON, M.D., President.

WEDNESDAY MORNING: Presiding—O. A. SANDER, M.D., member, Council on Occupational Health, and private practitioner of occupational medicine, Milwaukee; "Etiology and Diagnosis of Emphysema"—ROGER S. MITCHELL, M.D., Associate Professor of Medicine, University of Colorado Medical School; Panel: "Dust Diseases of the Lungs—Diagnosis, Evaluation and Management"—O. A. SANDER, M.D., moderator; FRANK J. PRINCI, M.D., Associate Professor of Industrial Medicine, University of Cincinnati; GILES F. FILLEY, M.D., Assistant Professor of Medicine, University of Colorado Medical School; ARTHUR J. VORWALD, M.D., Professor of Industrial Medicine, Wayne University College of Medicine; ROBERT F. BELL, M.D., Acting Head, Division of Industrial Medicine, University of Colorado Medical School.

WEDNESDAY AFTERNOON: Presid-

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People and Events

ing— E. S. JONES, M.D., member, Council on Occupational Health, and private Practitioner of occupational medicine; "Workmen's Compensation"—MELVIN N. NEWQUIST, M.D., member, Council on Occupational Health and consultant in occupational health; THEODORE C. WATERS, Attorney-at-Law; Panel: "Medical, Legal and Administrative Aspects of Workmen's Compensation"—MELVIN N. NEMQUIST, M.D., moderator; SAMUEL P. NEWMAN, M.D., orthopedist; JACK E. LINSTER, Vice-President, Employers Mutual of Wisconsin; HAROLD C. THOMPSON, Counsel, Colorado State Compensation Fund; and THEODORE C. WATERS.

► Industrial Medical Association of New Jersey held a meeting on March 17 at the Ford Motor Company, Mahwah, N.J. The scientific program featured a discussion of "The Low Back" by WILLIAM PALAZZO, M.D., Radiologist, Teaneck, N.J.

At the business meeting the following officers and directors were elected: President—THOMAS F. NEVINS, JR., M.D.; Vice-President—ANGELO CALABRESE, M.D.; Treasurer—EDMUND M. HARTMANN' M.D.; Secretary—MATHILDA R. VASCHAK, M.D.; directors—FRANCIS H. DEGRACE, M.D.; RALPH M. L. BUCHANAN, M.D.; and JOHN W. BORINO, M.D.

► Michigan Industrial Medical Association met in Detroit on March 24, at which time the following officers were elected: President—RICHARD MUDD, M.D.; President-Elect—WILLIAM JEND, JR., M.D.; Vice-President—HENRY J. KREULEN, M.D.; and Secretary-Treasurer—ROBERT P. MCINTOSH, M.D. DUANE L. BLOCK, M.D., was elected to the Board of Directors.

► Rocky Mountain Academy of Industrial Medicine held its second annual meeting in Denver, Colo., on March 1. J. F. PRINZING, M.D., was elected President; ROLAND ZARLENGO, M.D., President-Elect; FORDYCE MCCABE, M.D., Vice-President; IRVING OHR, M.D., Secretary-Treasurer; and N. E. MORAD, M.D., to a two-year term on the Board of Directors.

The scientific program featured a presentation by L. LORING BROCK, M.D., of the Colorado Heart Association, entitled "Factors to Consider in Placing the Cardiac Back on the Job."

► Industrial Medical Association of Philadelphia held its regular meeting April 26 at the Penn Sherwood Hotel. The scientific program was comprised of a panel discussion entitled "A New Look at Laboratory Procedures." Panel participants included CLAUDE P. BROWN, M.D., F. WILLIAM SUNDERMAN, M.D., F. WILLIAM SUNDERMAN, JR., M.D., and FREDERICK H. WILSON, M.D.

► Industrial Medical Association of Pittsburgh will hold its spring meeting at the University of West Virginia Medical Center in Morgantown, W. Va., on May 5. The scientific program in the morning will be devoted to the subject of heart disease, and the afternoon session will be concerned with a discussion of insurance costs.

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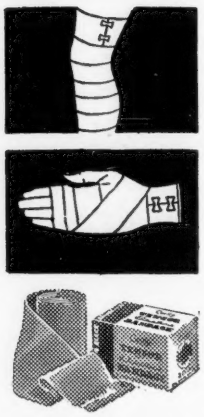

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